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The effect of health claims on ambivalent attitudes

Bachelor thesis



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Abstract

This study sought to view a relation between health claims on food products and the ambivalence people experience towards these products. An overview of knowledge about health claims, attitudinal ambivalence and their interaction is given. In two questionnaires the healthiness of a product was varied within subjects and the presence of a health claim on either the healthy or less healthy product was varied between subjects. Three pairs of food were used, with respectively a healthy and a less healthy product: corn flakes and chocolate corn flakes, frozen yogurt and dairy ice cream, vegetable crisps and smoked paprika crisps. 142 (128 female) Wageningen students were asked to rate the taste and healthiness of the six products and to indicate their experienced objective and subjective ambivalence towards the products. Only 1 significant interaction effect was found, concerning the objective ambivalence the participants felt less ambivalent towards both the unhealthy ice cream with health claim. For the corn flakes and crisps there were no significant effects with regard to the ambivalence, possibly due to a combination of the attention of the students and the packages with many colours, texts and images.

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Introduction

Problem

Nowadays there are many ways to stimulate consumers to make (more) healthy food choices. One of them is the use of health claims and symbols on food labels. CLYMBOL is a large research project which “aims to understand better the effects of health claims and symbols on food labels, and how this affects purchase and consumption behaviour” (“CLYMBOL,” 2013). There are many choices that consumers have to make, since there are food products from all kinds of brands available in stores. It is interesting to investigate how the health claims and symbols on food labels have effect on these choices of consumers to buy or not to buy a certain product. This is of importance for both consumers and producers. Consumers’ choices have effect on their eating behaviour and with this on their health (Provencher, Polivy, & Herman, 2009). Producers want to sell their products and if a health claim can help to improve the sales, they would improve their products to use health claims.

In this research the focus will be on health claims. Previous research already has especially focussed on the effect of symbols like the Dutch ‘Ik Kies Bewust’ logo (Dagevos & van Kleef, 2009; Roodenburg, Temme, Davies, & Seidell, 2009). It appeared that these logos can have a positive impact on the nutrient intakes of consumers (Roodenburg et al., 2009). However, from other research it appeared that this was a very small reduction of only less than 3% of the nutrient intake (Temme et al., 2011). Now, it becomes interesting to discover if health claims on foods make people think significantly different about the product. This change in attitude could affect the decisions consumers make regarding buying and eating.

In different theories the attitude plays a role in consumer decision making. One of them is the theory of planned behaviour, in which the choices of consumers are determined by consumers’ attitude, the subjective norm and the perceived behavioural control (Ajzen, 2011). The attitude is the degree to which a person has a favourable or unfavourable evaluation or estimation of the behaviour (Ajzen & Madden, 1986). There are many factors that influence the attitude of consumers towards food products. Often the attitude of a consumer is therefore not completely positive or completely negative, but the cognitions are in conflict with each other. For example, this is the case when a product is seen as both unhealthy (negative) and tasty (positive). This can be called attitudinal ambivalence (Thompson, Zanna, & Griffin, 1995) and from the cognitive dissonance theory it appears that people generally try to avoid these conflicts (Festinger, 1962).

Health claims might be able to change an attitude from being ambivalent to a positive or negative attitude towards a food product. It would become positive if one for example would like to eat a certain product, but does not know how healthy the product is. A health claim on the product would in this case make clear to the consumer that it has certain health benefits compared to other products. It can also be the other way around. Healthy products are perceived as less tasty than are unhealthy products (Raghunathan, Naylor, & Hoyer, 2006). So when someone is seeking for a delicious well-earned snack the health claim might confirm the thought that the product is less tasty and can make the consumer choose for another product.

Study relevance and purpose

Previous studies have assumed that people have a clear favourable or unfavourable evaluation towards products (Fullmer, Geiger, & Parent, 1991; Patch, Tapsell, & Williams, 2005), but this is often not the case. In this study ambivalence is taken into account to make clear to which extent consumers have both negative and positive feelings and/or thoughts. The influence of health claims on ambivalence has not yet been researched. This could be interesting, because the relationship between attitudes and intentions tends to be less for highly ambivalent consumers (Sparks, Conner, James, Shepherd, & Povey, 2001). When a health claim can take this ambivalence away and make the overall attitude positive, this might lead to higher buying intentions.

The aim of this study is to investigate the influence of health claims on the ambivalent attitudes of consumers.

Research question

This leads to the following research question:

How do health claims on food products affect consumers' (ambivalent) attitudes towards these products?

This research will try to find an answer to the research question with the help of these sub questions:

1. What is the influence of a health claim on an unhealthy product on a consumers' ambivalent attitude?
2. What is the influence of a health claim on a healthy product on a consumers' ambivalent attitude?

First previous research about health claims and attitudinal ambivalence are reviewed. Hypotheses are drawn up after this review of literature. Then a questionnaire is made to investigate the effect of health claims on the attitudinal ambivalence of Wageningen students. With a repeated measures ANOVA the results of the questionnaire are analysed and the results of this are discussed to reach a conclusion.

Theoretical framework

In this theoretical framework previous research about health claims and about attitudinal ambivalence will be discussed. First a definition of health claims is given and previous research about health claims is described to show what is already known. Next attitudinal ambivalence is described. With the information from these previous studies hypotheses can be formed and a basis is made for the research following.

Health claims

Two types of health claims are allowed when strict conditions are met from the European commission to provide on food products (Regulation, 2007):

- Function claim: any statement about a relationship between food and health.
- Risk reduction claim: any claim that states that consuming the food significantly reduces a risk factor in developing a human disease.

Functional foods are foods that do not simply contribute to a healthy diet like conventional healthy foods, but are related to a health benefit due to added ingredients. Functional foods can contain a health claim. There are many things that influence the acceptance and effect of health claims on functional foods on consumers' perception. It appears that risk perception, personal relevance, geographical factors, belief in health benefits and the perceived reward from functional foods all play a role in the perception of functional foods by consumers (Bech-Larsen & Grunert, 2003; Landström, Hursti, & Magnusson, 2009; Niva & Mäkelä, 2007; Urala & Lähteenmäki, 2004; Verbeke, 2005; Verbeke, Frewer, Scholderer, & De Brabander, 2007).

In this study the main focus lies on the effects of health claims on the perceived healthiness of foods and perception of taste. Specifically the effect of health claims on the conflicts people experience between perceptions of taste and health is examined. From previous studies it has appeared that taste is one of the most important choice reasons for functional foods (Bech-Larsen & Grunert, 2003; Urala & Lähteenmäki, 2003; Wardle, 1993). Wardle (1993) showed with her study that taste motivated the choice of 31 food items more than health did. It is interesting to investigate the influence of health claims on the perception of taste of foods.

Though taste is such an important choice factor, there is hardly scientific research yet available about the effects of health claims on perceived taste. Wansink, Ittersum, and Painter (2004) did a study where participants had to eat either products with or without a diet or healthy label and complete a questionnaire. It appeared that desserts were significantly rated to have a more appealing taste when they had a healthy label than when there was no label. However, there were no significant differences with entrees, probably because these are more utilitarian (Wansink et al., 2004). It seems that the type of product has an impact on the influence of the health claim on the perception of taste, where in this case the hedonic and palatable foods are evaluated more positive. This is in conflict with the 'unhealthy=tasty' intuition, from which you would expect that the products with health claim would be evaluated less tasty than the ones without health claim. However, in the study of Wansink et al. (2004) the participants had to rate the product after eating it and this might have caused their expectations to be disconfirmed and therefore made their evaluation more positive.

Taste might be more important in functional food choice, health is still an important factor (Urala & Lähteenmäki, 2003). People linked different functional foods to general well being or prevention of

disease. According to several studies consumers think products with health claims are healthier than other products (Andrews, Netemeyer, & Burton, 1998; Kozup, Creyer, & Burton, 2003; Mazis & Raymond, 1997; Roe, Levy, & Derby, 1999; Verbeke, Scholderer, & Lähteenmäki, 2009)

Attitudinal ambivalence

As explained in the introduction an attitude is the degree to which a person has a favourable or unfavourable evaluation or estimation of the behaviour (Ajzen & Madden, 1986). However, these evaluation/estimations are often not just black or white and can therefore be called ambivalent. Food is something which people typically have ambivalent attitudes about (Beardsworth, 1995). Everyone needs to eat several times a day and most people want to enjoy their food, but also want to stay healthy and slim. One can for example like chocolate chip cookies because they are delicious and on the other hand dislike them because they contain so many sugars and fats and makes him fat.

The occurring of ambivalence differs among different people. Restrained eaters are chronic dieters and have highly ambivalent attitudes towards palatable foods according to the Goal Conflict Model of Eating, more ambivalent than others (Stroebe, Mensink, Aarts, Schut, & Kruglanski, 2008). They experience a conflict between the goal of eating enjoyment and the goal of weight control and this makes their attitudes ambivalent. The moment of time also influences the occurring of ambivalence among people. Ambivalence is the highest at the moment that people have to make a choice (Hormes & Rozin, 2011).

The cognitive dissonance theory tells us that people do not like to experience these inconsistencies (Festinger, 1962). The conflicting thoughts make them feel uncomfortable and this motivates them to reach consonance thoughts. A recent study (Yan, 2014) compared the level of cognitive elaboration for univalent and ambivalent persons toward eating junk food and found that the ambivalent individuals reported a significantly higher level of cognitive elaboration than univalent individuals. From a study by de Liver, van der Pligt & Wigboldus (2008, in: (van Harreveld, van der Pligt, & Yael, 2009) it appears that ambivalence is reduced by cognitive processes that are provoked by the choice situation. People with ambivalent attitudes were put under cognitive load either when they were exposed to ambivalent information or when their evaluation was assessed. The cognitive load during the exposure appeared to lower the ambivalence and the cognitive load during evaluation led to higher levels of ambivalence. So, highly ambivalent people are likely to be influenced by the look of and information on the package of a product for example because they might think more about the product than univalent people do at the moment of choice in the supermarket. The health claim can possibly persuade people to pull themselves more towards a univalent attitude.

Concerning food products it is therefore also possible that people can reduce the dissonance caused by unhealthy, but tasty products, by thinking about it and choosing for functional foods next to it to compensate for an unhealthy lifestyle (Landström et al., 2009). In this way people can restore the balance in their evaluations and be more univalent.

Next to this, it is also important that attitudes are stable, because unstable univalent attitudes might only last for a short time and easily become ambivalent again. The stability of attitudes increases when the product becomes more familiar and people are more emotionally committed to the

product (Eagly, Chaiken, Petty, & Krosnick, 1995). Often functional food products are new to people, which may cause less stable attitudes. With ambivalent attitudes being less stable than non-ambivalent attitudes, they are more easily changed (Conner & Armitage, 2008).

Above it already became clear that ambivalent attitudes have several effects on people, different from univalent attitudes. This makes it important that ambivalent attitudes are measured, instead of only an overall attitude. An overall attitude only gives an average attitude. Highly mixed feelings would cancel each other out to and come to the same overall attitude as neutral feelings. In this way it does not make clear to which extent people have positive and negative feelings and/or thoughts, while measuring an ambivalent attitude does.

Influence of health claims on attitudinal ambivalence

Since ambivalent attitudes are less stable than non-ambivalent attitudes and therefore change more easily, health claims might have influence on the ambivalence of the attitude. Prior research has shown that consumers evaluated products as more healthy when a claim was presented about the product being healthy (Andrews et al., 1998; Roe et al., 1999). Therefore it can be expected that in this study all products with health claim will be perceived more healthy than the ones without a health claim. It is possible that attitudes will become less ambivalent with the health claim making consumers think more positive about the product. Consumers relate functional foods to having 'control over life and health, being a better person and feelings of well-being' (Urala & Lähteenmäki, 2003).

On the other hand it might also be that the health claim influences the perception of taste of the product. It is possible that the health claim causes the consumer to think the product is less tasty and push the attitude towards the negative side, because of the 'unhealthy=tasty intuition' (Raghunathan et al., 2006). In Figure 1 the conceptual framework is shown, visualising the link between health claims and attitudes, influenced by the perceived healthiness and expected taste of products.

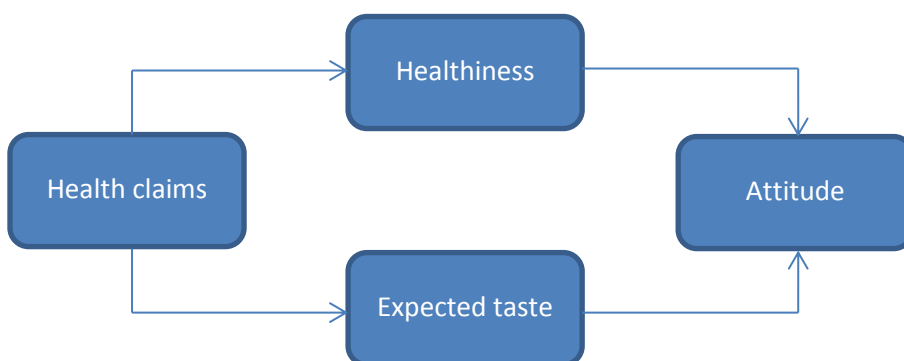


Figure 1: Conceptual framework showing the influencing factors for consumers' attitudes

Differences between healthy and unhealthy food products

The attitudes will not be influenced in the same way for all products. In this study a division is made between, when compared to each other, relatively healthy and unhealthy products. Table 1 shows what the expected influence is of products containing health claims versus products that do not contain health claims for both healthy and unhealthy products on the perception of taste and of health. These together will influence the attitudinal ambivalence.

| | | No health claim | | Health claim | |
|------------------|--------|-----------------|----|--------------|----|
| Unhealthy | Taste | Very tasty | ++ | Very tasty | ++ |
| | Health | Very unhealthy | -- | Unhealthy | - |
| Healthy | Taste | Tasty | + | Less Tasty | - |
| | Health | Healthy | + | Very healthy | ++ |

Table 1: Influence by health claims vs. no health claims on the perception of taste and health for healthy and unhealthy products

Unhealthy products

Since unhealthy products are often both tasty and unhealthy, it is expected that consumers will experience more ambivalence towards these products than towards healthy products. A health claim on palatable foods, in this case unhealthy, might convince a consumer to think more positive about the product. Restrained eaters for example can think to reach both the goal of eating enjoyment and the goal of controlling their weight, caused by the health claim. However, when consumers are looking for food as a snack, that has to meet their hedonistic needs, they might ignore the health information on the package (Balasubramanian & Cole, 2002).

Taken these things together it is expected that people will evaluate the unhealthy products as very tasty, regardless the presence of a health claim, and as more healthy (but still unhealthy) with a health claim. In this way the ambivalence will turn into a more positive attitude.

Healthy products

For healthy products this might be different. There is hardly any ambivalence experienced towards these products, because there is not really a conflict in thoughts and/or feelings. It is possible that the 'unhealthy = tasty' intuition has more influence in this case, since both the product itself is healthier and a health claim is presented. In that case it might be that people will perceive products as less tasty, since people do not rate healthy products as tasty as they rate unhealthy products (Raghunathan et al., 2006).

The health claim will probably make people think the product is healthier. Namely, "consumers see products that are intrinsically healthy as credible carriers of functional messages" (Siro, Kapolna, Kapolna, & Lugasi, 2008). Together with the possible influence of the 'unhealthy = tasty' intuition, this will shift the attitude to a more ambivalent attitude.

Hypotheses

From the theory described above the hypothesis is: Health claims on food products can change a consumers' (ambivalent) attitude to a positive or negative attitude.

The hypotheses for the two sub questions are:

1. A health claim on an unhealthy product will reduce the ambivalence of consumers and make them have a less negative attitude.
2. A health claim on a healthy product will cause consumers to experience attitudinal ambivalence.

With the results of a survey the hypotheses will be tested. In the survey there will be attention for both the perceptions of health and taste, since these are expected to be of influence on the ambivalence, and the experienced ambivalence.

Research methods

Study design and participants

The design of the study is a 2x2 mixed factorial design. The healthiness of a product (relatively healthy vs. less healthy) was varied within subjects. The three different product categories used in this study are corn flakes, ice cream and crisps. The presence of a health claim on either the health or less healthy product was varied between subjects.

142 Dutch students (128 female) in Wageningen have filled in the questionnaire. They varied in their age from 18-35 (mean age = 22). Dutch students in Wageningen were chosen, because in this way the effect of geographical factors would be small. The participants were randomly and evenly assigned to fill in one of two questionnaire in which they saw the healthy products containing health claims or a questionnaire in which they saw the unhealthy products containing health claims. Students were asked to fill in the survey by an e-mail that was sent to a panel and by a message on the Facebook page 'Wageningen Student Plaza'. To motivate students to fill in the survey two gift cards worth €25,- were raffled among the participants.

Stimuli

Six products were used to investigate the effect of health claims. They form three pairs of both respectively a relatively healthy and a less healthy product, which from now on will be called healthy and unhealthy product. The pairs are:

- Kellogg's Corn Flakes (healthy) and Kellogg's Corn Flakes Chocolate (unhealthy)
- AH frozen yogurt (healthy) and AH dairy ice cream (unhealthy)
- Tyrrells vegetable crisps (healthy) and Tyrrells smoked paprika crisps (unhealthy)

For each pair a different functional health claim was used. The corn flakes on the market in the Netherlands carries a health claim about vitamin D, a claim about vitamin D was therefore used in the study. The other health claims were assigned to the different products based on the ingredients the products already contain, so it would look logical and natural. For ice cream a claim about calcium was chosen, because people know ice cream contains milk and can relate that to the strength of bones. Crisps are (almost) always salted, so for these two products a health claim concerning the amount of salt was chosen. Pictures of the packages were edited with Adobe Photoshop to add the health claims. These pictures can be found in the in the appendix on page 23. The following health claims are allowed by the EU regulation (European Commission) and were respectively used for the corn flakes, ice cream and crisps:

- 'Source of Vitamin D, supports the immune system'
- 'With calcium to maintain strong bones'
- 'Less salt supports normal blood pressure'

The texts on the corn flakes and ice cream were in Dutch. The packages of the crisps contained only English texts, so the health claims on the crisps were also stated in English. It was assumed that the students could understand this, since they follow English courses and with the image of the crisps package it looked clear.

Procedure

Since the questionnaire was targeted towards Dutch students, all questions were asked in Dutch. Before the participants could start the questionnaire they first had to click on the 'next' button to be sent to the questionnaire. They were either sent to questionnaire 1, which compromised the condition in which the healthy products contained health claims, or to questionnaire 2, which compromised the condition in which the unhealthy products contained health claims. Both questionnaires were equal on all other aspects. An example of the questionnaire can be found in the appendix on page 25.

First, the participants was told what they could expect during the questionnaire, that their answers would be used for scientific research only and would be treated confidentially.

The participants had to answer questions about the six products, a healthy and unhealthy product from three product categories. The first product shown to all participants was corn flakes. After the questions about the corn flakes, the same questions were asked about the ice cream and about the crisps (where the words 'corn flakes' were respectively replaced by 'ice cream' and 'crisps'. The order in which participants saw the healthy and unhealthy product was counterbalanced. Since attitudes are highly context dependent (Crano & Prislin, 2011) the participants were told to imagine to be in the super market searching for corn flakes for breakfast. A picture of the corn flakes or corn flakes chocolate was shown and the participants were asked to rate its healthiness, taste and their willingness to buy the product.

In literature, often a distinction is made between two types for measuring ambivalence: subjective and objective ambivalence (Conner & Armitage, 2008). The first directly asks people about their mixed feelings, conflicting thoughts and indecision when evaluating something. Objective ambivalence is inferred by simultaneous occurrence of both strong positive and negative evaluations. Both objective and subjective ambivalence were measured for the products. At the end of the survey, participants rated the importance of health and taste for the three product categories, filled out a measure of restrained eating and provided demographic information.

The survey ended with showing gratitude towards the participants and room for them to leave remarks. The participants who would like to win one of the gift cards worth €25,- had to fill in their e-mailaddresses.

Measures

Healthiness and taste perceptions

To discover the influence of health claims on a healthy/unhealthy product it was important to know how healthy the product is perceived by consumers. Since taste is also important for people in their choice to eat a certain product this was also asked. The participants could indicate with a slider on a scale from 'completely not' to 'completely' how tasty and how healthy they found the product. By using a slider, the participants would not be limited to only a few choices, but could drag the slider to any place on the line.

Willingness to buy

The willingness to buy is important in the super market and it is interesting to discover if the health claims also make sense in this decision. The participants was asked to indicate with a slider on a scale from 'completely not' to 'completely' if they would like to buy the product.

Objective and subjective ambivalence

Next, the attitudes from the participants towards the products were measured. There exist different ways to measure this and in this research there was chosen to use both positive and negative evaluations (objective ambivalence) and the evaluation of mixed feelings, conflicting thoughts and indecision (subjective ambivalence) (Olsen, Prebensen, & Larsen, 2009; Priester & Petty, 1996). To measure the objective ambivalence the participants were asked how positive they were if they only thought about the positive aspects of the products and how negative they were if they only thought about the negative aspects of the products. For the subjective ambivalence the participants were separately asked to which extent they experienced mixed feelings, conflicting thoughts and indecision about the products. The questions asked about the products had to be answered by dragging a slider between 'completely not' and 'completely'.

Health and taste importance

To measure the importance of healthiness and a nice taste for the respondents, they were asked to drag two sliders to respectively the level of importance they think healthiness and the nice taste of each product category is. The respondents had to indicate on a 7-point scale (from never to very often) how often they eat the products for each product category.

Restrained eating

Finally, questions about the respondent were asked. From theory it appeared that restrained eaters have more ambivalent attitudes than non-restrained eaters. To know whether a respondent is a restrained eater ten questions about the control of food intake were asked (Van Strien, Frijters, Bergers, & Defares, 1986).

Demographic variables

The questionnaire ended with questions about demographic characteristics. The age, gender and study domain of the respondents was asked. The study domain could be one of the following domains that exist for Wageningen University: agrotechnology, food technology and nutrition, animal sciences, environmental sciences, plant sciences and social sciences.

Results

In this section the results for the analyses on corn flakes, ice cream and crisps are discussed. First, the steps before the repeated measures ANOVA are mentioned. After that the results of the analyses on objective ambivalence, subjective ambivalence, perceived taste, perceived healthiness and the willingness to buy the product are described. IBM SPSS Statistics for Windows was used to perform the analyses.

Randomization

First, the randomization of the two groups was tested in SPSS. This is because the groups are not allowed to have any significant difference to make sure that differences between the groups are caused by the presence of a health claim. Group 1 (where the healthy products had health claims) consists of 74 participants and group 2 (where the unhealthy products had health claims) of 68 participants. The randomization is analysed by using a one-way ANOVA test for the variables 'age', 'restrained eating' and the importance of healthiness, the importance of a nice taste and the frequency participants eat the products. A Chi-Square test was used for the variables 'gender' and 'type of study'. The tests are all based on a 0.05 significance level.

There are no significant differences in age ($p=0.163$) and in the degree of restrained eating (0.405) between the groups. The participants scored on average 2.35 (standard deviation = 0.76) on the restrained eating scale from 1 to 5. So, the participants are on average no extremely restrained or unrestrained eaters. 128 of the 142 participants were women and 14 were men and there is no significant difference between the division of the men and women over the groups ($p=0.337$). The Pearson Chi-Square test is inaccurate for the randomization check of 'type of study', since there was an expected count of less than 5 for 33.3%. Therefore a Fisher's exact test was done to make sure the sample distribution is good to use. From the Fisher's exact test it appeared that there are no significant differences between the fields of study of the participants ($p= 0.163$).

From a one-way ANOVA it appeared that the groups did not significantly differ in the importance of healthiness, the importance of a nice taste and the frequency they eat the products. The F- and p -values are shown in Table 2.

| | Importance healthiness F (1, 140), p | Importance nice taste F (1, 140), p | Frequency F (1, 140), p |
|-------------------|---|--|------------------------------|
| Cornflakes | 0.083, .773 | 0.519, .473 | 0.693, .407 |
| Ice cream | 1.712, .193 | 0.468, .495 | 1.926, .167 |
| Crisps | 0.527, .469 | 1.940, .166 | 0.427, .515 |

Table 2: Results one-way ANOVA, differences between group 1 & 2 for importance of healthiness and taste and the frequency participants eat the products

Reliability of subjective ambivalence measures

A reliability analysis was done to see if the questions about feelings, thoughts and judgement could be combined into one variable that explained the participants' subjective ambivalence. The Cronbach's Alpha can score a number between 0 and 1. If it is higher than 0.8, it can be accepted and that means that the questions explain the same subject (Field, 2009). For all six products the questions could be combined ($\alpha > 0.8$). The values of Cronbach's Alpha for the products are given in Table 3 on the next page.

| | Cronbach's Alpha |
|-----------------------|------------------|
| Corn flakes | 0.85 |
| Chocolate corn flakes | 0.85 |
| Frozen yogurt | 0.86 |
| Dairy ice cream | 0.85 |
| Vegetable crisps | 0.91 |
| Smoked paprika crisps | 0.88 |

Table 3: Cronbach's Alpha measures resulting from the reliability analysis for the subjective ambivalence

Repeated measures ANOVA

A repeated measures ANOVA was done for the three product categories to calculate the effects within subjects, between subjects and the interaction effects. The within subjects variables were the healthy and unhealthy products and the between subjects factor was the presence of a health claim on either the healthy or unhealthy products. The results of the repeated measures ANOVA are shown per construct (taste, healthiness, willingness to buy, objective ambivalence and subjective ambivalence) in a table and the significant results are mentioned afterwards. The ANOVA was based on a .05 significance level. The effect sizes are calculated with the use of this formula:

$$r = \sqrt{\frac{F(1, df_R)}{F(1, df_R) + df_R}} \quad (\text{Field, 2009, p. 532})$$

Perceived taste

| | M _{healthy hc} (St. dev.) | M _{healthy nohc} (St.dev.) | M _{unhealthy hc} (St.dev.) | M _{unhealthy no hc} (St.dev.) |
|-------------|------------------------------------|-------------------------------------|-------------------------------------|--|
| Corn flakes | 49.61 (22.96) | 55.35 (23.56) | 60.74 (23.72) | 60.57 (23.65) |
| Ice cream | 60.85 (22.09) | 64.09 (21.12) | 59.87 (26.67) | 62.99 (22.83) |
| Crisps | 44.96 (25.67) | 51.34 (23.98) | 57.78 (22.81) | 54.54 (25.65) |

Table 4: Mean values for the perceived taste of the different products, healthy and unhealthy, with and without health claim

| Product | F _{healthy/unhealthy} (1, 140) | p | F _{hc/no hc} (1, 140) | p | F _{interaction} (1, 140) | p |
|-------------|--|------|-----------------------------------|------|--------------------------------------|------|
| Corn flakes | 11.77 | .001 | 0.89 | .348 | 1.37 | .244 |
| Ice cream | 0.18 | .670 | 0.00 | .985 | 1.70 | .195 |
| Crisps | 10.10 | .002 | 2.16 | .144 | 0.39 | .534 |

Table 5: F-values and p-values for the perceived taste of the different products within and between subjects effects and interaction effects

The chocolate corn flakes are significantly evaluated as tastier than the other, more healthy, corn flakes. The effect size $r=0.28$ is medium for this effect. A similar effect is also found for the crisps. There is a significant difference between the perceived taste of the vegetable crisps and of the smoked paprika crisps. The last mentioned is tastier according to the participants. For this, the effect size is medium as well, with $r=0.26$.

There are no significant effects found of the health claim on the perceived taste for all products.

Perceived healthiness

| | M _{healthy hc} (St. dev.) | M _{healthy nohc} (St.dev.) | M _{unhealthy hc} (St.dev.) | M _{unhealthy no hc} (St.dev.) |
|--------------------|------------------------------------|-------------------------------------|-------------------------------------|--|
| Corn flakes | 50.22 (22.19) | 49.69 (21.19) | 30.46 (19.29) | 24.59 (13.36) |
| Ice cream | 47.11 (21.38) | 49.47 (20.60) | 19.90 (14.69) | 18.27 (14.89) |
| Crisps | 46.69 (22.66) | 46.82 (21.34) | 27.66 (17.46) | 24.51 (17.02) |

Table 6: Mean values for perceived healthiness of the different products, healthy and unhealthy, with and without health claim

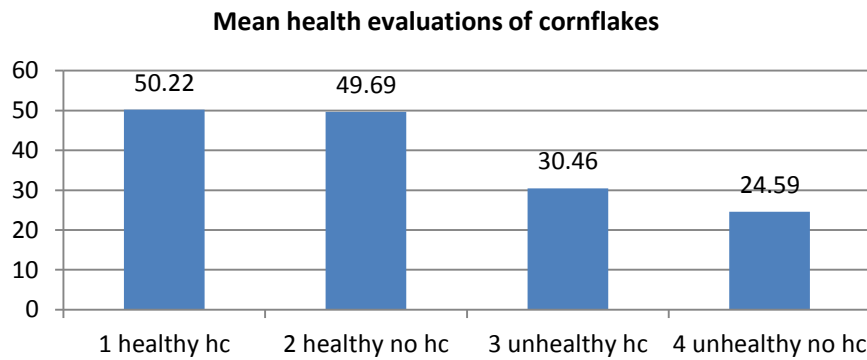
| Product | F _{healthy/unhealthy} (1, 140) | p | F _{hc/no hc} (1, 140) | p | F _{interaction} (1, 140) | p |
|--------------------|--|-------|-----------------------------------|------|--------------------------------------|------|
| Corn flakes | 199.99 | <.001 | 0.89 | .346 | 4.05 | .046 |
| Ice cream | 269.74 | <.001 | 0.65 | .423 | .04 | .836 |
| Crisps | 151.65 | <.001 | 0.33 | .568 | 0.81 | .371 |

Table 7: F-values and p-values for perceived healthiness of the different products within and between subjects effects and interaction effects

For all product categories, the unhealthy products are perceived less healthy than the healthy products. For the corn flakes the effect size $r = 0.77$ is large, as well as for ice cream, where $r = 0.81$. Also for the crisps the effect size is large, with $r = 0.72$. As it was the intention to have a clear difference in healthiness between the two products of each category, this confirms that the manipulation in this study has gone well.

Furthermore, there is one interaction effect. This interaction effect exists from the health claims on the evaluated healthiness of healthy and unhealthy corn flakes. The mean values of the cornflakes are visualized in Graph 1. The Pairwise comparisons show that this interaction effect can be found for the chocolate corn flakes. In the appendix on page 30 the SPSS output for the Pairwise comparisons can be found. The unhealthy corn flakes with health claim (nr. 3 in Graph 1) are significantly evaluated as more healthy than the unhealthy corn flakes without health claim (nr. 4) with $F(1, 140) = 4.49$ and $p = .036$. This means that the health claim had a positive influence on the perceived healthiness of the unhealthy products. For the healthy corn flakes this effect is not significant. There can also be found a significant difference within the surveys: the healthy corn flakes with health claim (nr. 1) are evaluated healthier than the unhealthy corn flakes without health claim (nr. 4) according to the participants. For this difference $F(1, 140) = 136.25$ and $p < 0.001$. The healthy corn flakes without health claim (nr. 2) are also found to be more healthy than the unhealthy products with health claim (nr. 3), where $F(1, 140) = 70.57$ and $p < 0.001$.

There are no significant effects found of the health claim on the perceived healthiness on the other products.



Graph 1: Mean health evaluations of healthy and unhealthy corn flakes with and without healthclaim

Willingness to buy

| | M _{healthy hc} (St. dev.) | M _{healthy nohc} (St.dev.) | M _{unhealthy hc} (St.dev.) | M _{unhealthy no hc} (St.dev.) |
|--------------------|------------------------------------|-------------------------------------|-------------------------------------|--|
| Corn flakes | 41.62 (23.80) | 44.19 (23.76) | 42.24 (25.46) | 36.99 (22.09) |
| Ice cream | 53.70 (24.78) | 59.28 (22.23) | 43.62 (28.92) | 50.59 (23.53) |
| Crisps | 41.14 (25.08) | 47.56 (25.21) | 46.26 (22.53) | 45.23 (25.07) |

Table 8: Mean values for the willingness to buy the different products, healthy and unhealthy, with and without health claim

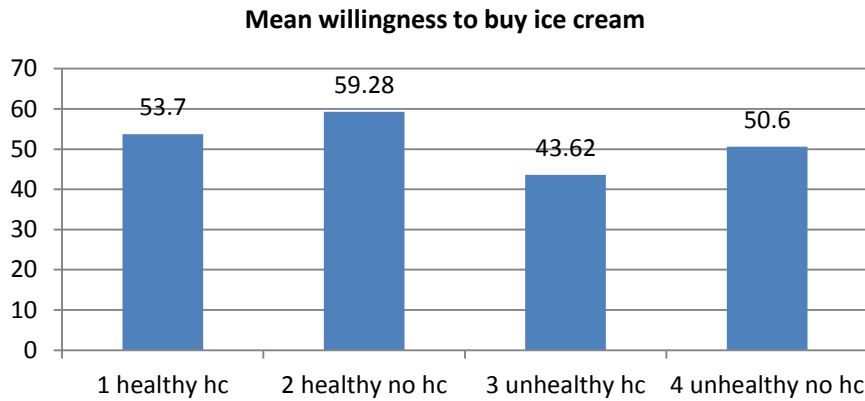
| Product | F _{healthy/unhealthy} (1, 140) | p | F _{hc/no hc} (1, 140) | p | F _{interaction} (1, 140) | p |
|--------------------|--|-------|-----------------------------------|------|--------------------------------------|------|
| Corn flakes | 2.42 | .122 | 1.33 | .250 | 0.40 | .528 |
| Ice cream | 13.34 | <.001 | 0.05 | .833 | 5.96 | .016 |
| Crisps | 0.32 | .575 | 1.29 | .257 | 1.17 | .282 |

Table 9: F-values and p-values for willingness to buy the different products within and between subjects effects and interaction effects

There are only two significant effects on the willingness to buy and these are both found for the ice cream. Participants would significantly rather buy frozen yogurt than dairy ice cream, $r = 0.29$, so this is a medium effect size. The mean values for both ice creams with and without health claim are visualized in Graph 2.

The interaction effect is of both the health claims and healthiness of the product on the willingness to buy the ice cream, with a small effect size of $r = 0.20$. The dairy ice cream with health claim (nr. 3 in Graph 2) seems to be less wanted than the dairy ice cream without a health claim (nr. 4). This effect is analysed with pairwise comparisons for both the healthiness and the presence of a health claim. In the appendix at page 31 the SPSS output for the Pairwise comparisons can be found. It appears that the difference between the willingness to buy dairy ice cream with or without health claim is not significant. The only significant effect found from this comparison is that with $F(1, 140) = 17.82$ and $p < 0.001$ the participants would rather buy frozen yogurt without a health claim (nr. 2) than dairy ice cream with a health claim (nr. 3).

There are no significant effects found of the health claim on the willingness to buy the other products.



Graph 2: Mean willingness to buy for healthy and unhealthy ice cream with and without healthclaim

Objective ambivalence

Values from the positive and negative attitudes which were asked for in the questionnaire are combined into one variable with the Griffin formula or the so-called similarity-intensity model (Priester & Petty, 1996; Thompson et al., 1995). This calculates the objective ambivalence (A) by taking the dominant value (D), the largest of the positive and negative value, and the conflicting value (C), the lowest of the positive and negative value together in this formula:

$$A = (C+D)/2 - (D-C)$$

The values of objective ambivalence became with this formula between -100 and 200.

In Table 10 and Table 11 the values from the repeated measures ANOVA are shown.

| | M _{healthy hc} (St. dev.) | M _{healthy nohc} (St.dev.) | M _{unhealthy hc} (St.dev.) | M _{unhealthy no hc} (St.dev.) |
|--------------------|------------------------------------|-------------------------------------|-------------------------------------|--|
| Corn flakes | 20.31 (50.81) | 27.76 (54.29) | 19.81 (62.67) | 12.57 (53.82) |
| Ice cream | 28.80 (53.49) | 36.91 (53.93) | 24.60 (62.13) | 45.08 (59.40) |
| Crisps | 42.77 (53.72) | 38.32 (59.37) | 39.91 (57.67) | 45.00 (64.39) |

Table 10: Mean values for the objective ambivalence for the different products, healthy and unhealthy, with and without health claim

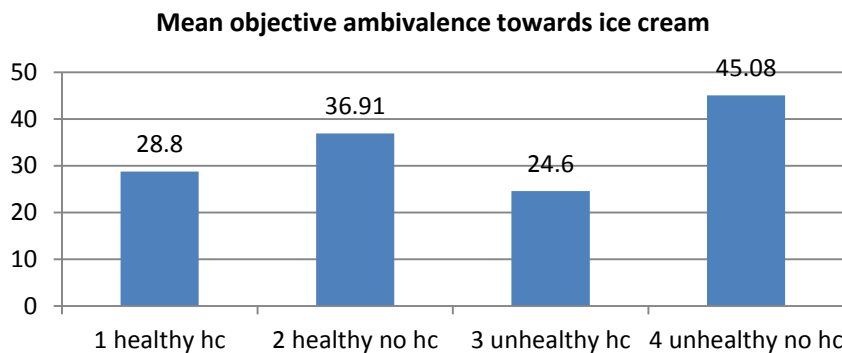
| Product | F _{healthy/unhealthy} (1, 140) | p | F _{hc/no hc} (1, 140) | p | F _{interaction} (1, 140) | p |
|--------------------|--|------|-----------------------------------|------|--------------------------------------|------|
| Corn flakes | 2.85 | .094 | .83 | .364 | < 0.01 | .982 |
| Ice cream | 0.14 | .707 | 70.75 | .444 | 7.32 | .008 |
| Crisps | 0.15 | .703 | 0.31 | .578 | < 0.01 | .949 |

Table 11: F-values and p-values for objective ambivalence for the different products within and between subjects effects and interaction effects

There are only two significant effects. There is a marginal significant difference in objective ambivalence between the healthy and unhealthy corn flakes, $r=0.14$. Consumers are slightly more ambivalent about the healthy corn flakes than the chocolate corn flakes. There exists an interaction effect for the two types of ice cream, $r=0.22$. In the appendix at page 33 the SPSS output for the Pairwise comparisons can be found. The participants are significantly more ambivalent towards the dairy ice cream without health claim (nr. 4 in Graph 3) than to the dairy ice cream with health claim (nr. 3). The mean difference is 20.48 and $p = .047$. This significant difference is in line with hypothesis

1, which stated that a health claim on an unhealthy product would lower the experienced ambivalence. For the frozen yogurt the graph shows a similar difference, with the objective ambivalence of the participants being higher for the frozen yogurt without health claim (nr. 2) than with health claim (nr. 1). However, this effect is not significant.

There are no significant effects found of the health claim on the objective ambivalence for the other products.



Graph 3: Mean objective ambivalence for healthy and unhealthy ice cream with and without health claim

Subjective ambivalence

| | M _{healthy hc} (St. dev.) | M _{healthy nohc} (St.dev.) | M _{unhealthy hc} (St.dev.) | M _{unhealthy no hc} (St.dev.) |
|--------------------|------------------------------------|-------------------------------------|-------------------------------------|--|
| Corn flakes | 45.02 (23.28) | 43.13 (21.35) | 46.72 (22.13) | 47.71 (21.59) |
| Ice cream | 38.71 (20.40) | 37.14 (20.46) | 41.85 (23.49) | 37.70 (19.44) |
| Crisps | 46.06 (20.60) | 43.86 (25.13) | 39.68 (21.90) | 37.69 (18.90) |

Table 12: Mean values for the subjective ambivalence for the different products, healthy and unhealthy, with and without health claim

| Product | F _{healthy/unhealthy} (1, 140) | p | F _{hc/no hc} (1, 140) | p | F _{interaction} (1, 140) | p |
|--------------------|--|------|-----------------------------------|------|--------------------------------------|------|
| Corn flakes | 2.94 | .089 | 0.20 | .250 | 0.06 | .807 |
| Ice cream | 0.87 | .353 | 0.20 | .658 | 2.07 | .153 |
| Crisps | 11.66 | .001 | <.01 | .974 | 1.30 | .257 |

Table 13: F-values and p-values for subjective ambivalence for the different products within and between subjects effects and interaction effects

For the subjective ambivalence measures there are only two significant effects found and no interaction effects. The participants appeared to be significantly more ambivalent towards the vegetable crisps than the smoked paprika crisps and for this the effect size $r=0.28$. A marginal effect is found for the subjective ambivalence for the corn flakes. The participants experienced slightly more subjective ambivalence for the chocolate corn flakes than for the healthy corn flakes, $r=0.14$. The effect is only marginal, but in line with the hypothesis stating that an unhealthy product would cause higher attitudinal ambivalence than a healthy product.

There are no significant effects found of the health claim on subjective ambivalence for all products.

Discussion

The participants did not indicate a different level of subjective ambivalence for the healthy products or for the unhealthy products when a health claim was presented on the package. The objective ambivalence, though, was different for the evaluation of the ice cream, where participants were more ambivalent towards dairy ice cream without health claims than with health claims. For this product hypothesis 1: 'A health claim on an unhealthy product will reduce the ambivalence of consumers and make them have a less negative attitude' can be accepted, but hypothesis 2: 'A health claim on a healthy product will cause consumers to experience attitudinal ambivalence' can be rejected. Different reasons can together explain the found results and these reasons are each mentioned below.

Busy students

For the other products the hypotheses are rejected. A possible reason for this is that participants did not want to spend much time on the questionnaire and filled it in without looking very closely to the packages. Where the ice cream did not have much images and texts on the package, the health claims might have been noticed more often by the participants than on the other product packages, which contained more different colours, images and texts. Still, only the objective ambivalence was significantly different between the ice cream with and without health claim and there was no difference in subjective ambivalence. A lack of time could however not only have its' effects for filling in a questionnaire, but also for the time spending in the supermarket. It is possible that the participants would not have noticed the health claims in the supermarket either, due to hurry.

Contradictions and similarities

Results from other studies showed that health claims reduced experienced ambivalence (Andrews et al., 1998; Raghunathan et al., 2006; Roe et al., 1999). Though these findings are contradictory with the outcomes of several others studies, some authors could already have told us that there would be no effect. Like Garretson and Burton (2000) who state "Claims do not affect product evaluations or purchase intentions". In another study there is differentiated between the knowledge of consumers (Roe et al., 1999). It is possible that the participants were already familiar with the stated claims and for that reason had no effect. From the study from Roe et al. (1999) it appeared that only "claims that provided new information had a positive effect on attitude to the product".

Survey

The objective ambivalence might be influenced by the fact that participants misinterpreted the questions about this subject. Some participants indicated at the end of the survey that they had misinterpreted the first questions about the solely positive and solely negative evaluation of the product. There were participants that did not know what was mentioned with the question. Others thought the negative side to be on the right, instead of noticing they could slide from 'completely not' to 'completely'. It is not known at which point in the questionnaire participants noticed this, which made it not useful to leave questions from certain participants out.

It is possible that an online survey was not the best way to measure the ambivalence of consumers. The consumers were not able to touch the products and look at the whole package. An advantage for this is that only the influence of the health claim was measured and nutrient information did not play

a role. However, maybe this is important for consumers to see next to the health claim for their thoughts and feelings about the products. Another setting where the products could be seen and touched in real life therefore might have been better.

Further research

In this study the students were instructed to imagine to be in the supermarket, looking for the product that was shown. It is possible that this explanation of the context was not specific enough. Since attitude reports are highly context dependent, this might be better explained in future research.

As said before, it is possible that the health claims did not get much attention of the participants and therefore had no influence on the ambivalence. To attract the attention of consumers to the health claims on the product packages, the claims could have been written bigger and the product package could differ more from original product packages to stand out with other colours and images. The product categories used in this study were consciously chosen, especially crisps and ice cream, which were expected to be products to which consumers have a clear judgment. However, with these product categories the participants were not very extreme in their positive (around 65 on a scale from 1 to 100) and negative evaluations (around 40 on a scale from 1 to 100). Maybe other product categories could be used to arouse more extreme evaluations and to notice changes in these evaluations due to the presence of a health claim.

Although taste and health are one of the most important factors, there exist more factors that influence food choice and attitudes towards foods. This study was not large, so there was no time to investigate the influence of these other factors. In future research factors health interest and price could also be taken into account as dependent variables. When consumers are highly interested in health they will look for healthy products to buy and eat. Then they are more likely to notice information on the package that confirms their search for healthy products. The price is often an important factor for consumers, especially when they do not have much money to spend. A higher priced product might on the one hand be less likely to be bought when a cheaper similar product is also available. On the other hand, the higher price might let people think that the quality of the product is better. Both effects might be able to decrease or increase the ambivalence.

A last recommendation for further research has to do with the participants. It could be that Wageningen students experience different levels of ambivalence than another sample of participants and that do not see product with health claims as useful for them, because they are relatively healthy compared to other Dutch inhabitants. A more diverse group, with for example lower educated people, could possibly lead to different results. Lower educated people could know less about functional foods and therefore be interested in health claims or, the other way around, they could not care about the health claims when they do not experience any health problems. Older people on the other hand might have more problems with their health and appreciate the products with health claims, because they might help them staying healthy.

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Appendix

Product images shown to the participants







Example of questionnaire 1

This example shows the questions that are asked in the questionnaire. For the products, in this example only the questions about the healthy corn flakes are asked. The questions about the other products were identical to these. The black lines show the page breaks in the questionnaire.

Beste deelnemer,

Fijn dat je wilt bijdragen aan mijn onderzoek. Je wordt gevraagd om zes voedingsproducten te beoordelen en daarna volgen nog een aantal vragen over jezelf. Het beantwoorden van de vragen duurt ongeveer vijf minuten.

Er zijn geen goede of foute antwoorden mogelijk, dus probeer alles naar waarheid in te vullen en beantwoord de vragen met de antwoorden die je als eerste te binnen schieten.

Je antwoorden zullen vertrouwelijk worden behandeld, waarbij je anonimiteit wordt gewaarborgd. De antwoorden op de vragen zullen enkel worden gebruikt voor wetenschappelijk onderzoek. Als je vragen hebt over de vragenlijst, kun je deze mailen naar anke.vantklooster@wur.nl.

Aan het einde van de vragenlijst krijg je de mogelijkheid je WURmailadres in te vullen om kans te maken op een van de VVV-bonnen t.w.v. €25,-. Je e-mailadres zal vertrouwelijk worden behandeld en alleen worden gebruikt om de twee winnaars bekend te kunnen maken.

Beeld je bij dit product in dat je in de supermarkt staat, op zoek naar cornflakes voor je ontbijt.



Beantwoord de vragen over deze cornflakes door de slider te schuiven.

| | Helemaal niet | Helemaal wel |
|----------------------------------|-----------------------|--------------|
| Hoe lekker lijkt je dit product? | <input type="range"/> | |
| Hoe gezond vind je dit product? | <input type="range"/> | |
| Zou je dit product willen kopen? | <input type="range"/> | |

Bij ieder product worden een aantal vragen gesteld over jouw houding tegenover dat product. Mensen kunnen een positieve houding hebben tegenover een product, maar het kan ook zijn dat ze een negatieve houding hebben tegenover een product. Daarnaast is het nog mogelijk zowel een positieve als een negatieve houding tegelijk te hebben, als men zowel negatieve als positieve gedachten en/of gevoelens heeft over een product.

Beantwoord de volgende vragen over je houding tegenover dit product.

| | Helemaal niet | Helemaal wel |
|--|---------------|--------------|
| Wanneer je enkel en alleen denkt aan de positieve aspecten, in hoeverre ben je dan positief over dit product? | | |
| Wanneer je enkel en alleen denkt aan de negatieve aspecten, in hoeverre ben je dan negatief tegenover dit product? | | |
| In hoeverre ervaar je gemengde gevoelens tegenover dit product? | | |
| In hoeverre ervaar je tegenstrijdige gedachten tegenover dit product? | | |
| In hoeverre vind je het moeilijk een eenduidig oordeel te vormen over dit product? | | |

Geef aan hoe belangrijk je de volgende factoren vindt bij aankoop van cornflakes.

| | Helemaal niet | Helemaal wel |
|--|---------------|--------------|
| Hoe belangrijk vind je het dat cornflakes gezond zijn? | | |
| Hoe belangrijk vind je het dat cornflakes lekker zijn? | | |

Hoe vaak eet je cornflakes?

Nooit



Zelden



Af en toe



Soms



Regelmatig



Vaak



Heel vaak



Nu volgen een aantal vragen over jezelf.

Geef antwoord op de volgende vragen.

| | Nooit | Zelden | Soms | Vaak | Heel vaak |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Wanneer je iets zwaarder bent geworden, eet je dan minder dan dat je gewoonlijk doet? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Probeer je minder te eten tijdens maaltijden dan dat je eigenlijk zou willen? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Hoe vaak weiger je eten of drinken, omdat je bang bent dat je zwaarder wordt? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Houd je exact bij wat je eet? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Eet je opzettelijk producten waarvan je afvalt? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Wanneer je teveel hebt gegeten, eet je dan de daarop volgende dagen minder? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Eet je opzettelijk minder om te voorkomen dat je zwaarder wordt? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Hoe vaak probeer je geen tussendoortjes te nemen, omdat je op je gewicht let? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Hoe vaak probeer je 's avonds niet te eten, omdat je op je gewicht let? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Houd je rekening met je gewicht wanneer je eet? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Hoe oud ben je?

- ☐ 17
- ☐ 18
- ☐ 19
- ☐ 20
- ☐ 21
- ☐ 22
- ☐ 23
- ☐ 24
- ☐ 25
- ☐ 26
- ☐ 27
- ☐ 28
- ☐ 29
- ☐ 30
- ☐ 31
- ☐ 32
- ☐ 33
- ☐ 34
- ☐ 35

Wat is je geslacht?

- ☐ Man
- ☐ Vrouw

Tot welke van deze afdelingen behoort je huidige studie?

- ☐ Agrotechnologie
- ☐ Levensmiddelentechnologie en voeding
- ☐ Dierwetenschappen
- ☐ Omgevingswetenschappen
- ☐ Plantenwetenschappen
- ☐ Maatschappijwetenschappen

Dit is het einde van de vragenlijst, bedankt voor je deelname! Is je nog iets bijzonders opgevallen bij het invullen van de vragenlijst?

Als je kans wilt maken op een VVV cadeaubon t.w.v. €25,-, vul dan hier je WURmailadres in. Je mailadres wordt alleen gebruikt voor het bekendmaken van de twee winnaars. Door het invullen van je mailadres sta je toe dat je voorletter en achternaam bekend worden gemaakt in een mail naar alle deelnemers aan de loting wanneer je een VVV cadeaubon wint.

SPSS output for the Pairwise comparisons

Pairwise comparisons for the perceived healthiness of the corn flakes

Compare survey:

Estimates

Measure: Cornflakes_gezond

| Survey | Gezond | Mean | Std. Error | 95% Confidence Interval | |
|------------|--------|--------|------------|-------------------------|-------------|
| | | | | Lower Bound | Upper Bound |
| HCgezond | 1 | 50,216 | 2,525 | 45,225 | 55,208 |
| | 2 | 24,595 | 1,914 | 20,810 | 28,379 |
| HCongezond | 1 | 49,691 | 2,634 | 44,484 | 54,898 |
| | 2 | 30,456 | 1,997 | 26,508 | 34,404 |

Pairwise Comparisons

Measure: Cornflakes_gezond

| Gezond | (I) Survey | (J) Survey | Mean Difference (I-J) | Std. Error | Sig. ^b | 95% Confidence Interval for Difference ^b | |
|--------|------------|------------|--------------------------|------------|-------------------|--|-------------|
| | | | | | | Lower Bound | Upper Bound |
| 1 | HCgezond | HCongezond | ,525 | 3,648 | ,886 | -6,688 | 7,738 |
| | HCongezond | HCgezond | -,525 | 3,648 | ,886 | -7,738 | 6,688 |
| 2 | HCgezond | HCongezond | -5,861 [*] | 2,766 | ,036 | -11,330 | -,392 |
| | HCongezond | HCgezond | 5,861 [*] | 2,766 | ,036 | ,392 | 11,330 |

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Univariate Tests

Measure: Cornflakes_gezond

| Gezond | | Sum of Squares | df | Mean Square | F | Sig. |
|--------|----------|----------------|-----|-------------|-------|------|
| 1 | Contrast | 9,769 | 1 | 9,769 | ,021 | ,886 |
| | Error | 66037,055 | 140 | 471,693 | | |
| 2 | Contrast | 1217,414 | 1 | 1217,414 | 4,490 | ,036 |
| | Error | 37960,705 | 140 | 271,148 | | |

Each F tests the simple effects of Survey within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

Compare healthiness:

Pairwise Comparisons

Measure: Cornflakes_gezond

| Survey | (I) Gezond | (J) Gezond | Mean Difference (I-J) | Std. Error | Sig. ^b | 95% Confidence Interval for Difference ^b | |
|------------|------------|------------|--------------------------|------------|-------------------|--|-------------|
| | | | | | | Lower Bound | Upper Bound |
| HCgezond | 1 | 2 | 25,622 [*] | 2,195 | ,000 | 21,282 | 29,961 |
| | 2 | 1 | -25,622 [*] | 2,195 | ,000 | -29,961 | -21,282 |
| HCongezond | 1 | 2 | 19,235 [*] | 2,290 | ,000 | 14,708 | 23,762 |
| | 2 | 1 | -19,235 [*] | 2,290 | ,000 | -23,762 | -14,708 |

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Multivariate Tests

| Survey | | Value | F | Hypothesis df | Error df | Sig. |
|------------|--------------------|-------|----------------------|---------------|----------|------|
| HCgezond | Pillai's trace | ,493 | 136,250 ^a | 1,000 | 140,000 | ,000 |
| | Wilks' lambda | ,507 | 136,250 ^a | 1,000 | 140,000 | ,000 |
| | Hotelling's trace | ,973 | 136,250 ^a | 1,000 | 140,000 | ,000 |
| | Roy's largest root | ,973 | 136,250 ^a | 1,000 | 140,000 | ,000 |
| HCongezond | Pillai's trace | ,335 | 70,566 ^a | 1,000 | 140,000 | ,000 |
| | Wilks' lambda | ,665 | 70,566 ^a | 1,000 | 140,000 | ,000 |
| | Hotelling's trace | ,504 | 70,566 ^a | 1,000 | 140,000 | ,000 |
| | Roy's largest root | ,504 | 70,566 ^a | 1,000 | 140,000 | ,000 |

Each F tests the multivariate simple effects of Gezond within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

Pairwise comparisons for the willingness to buy ice cream

Compare survey:

Estimates

Measure: IJs_kopen

| Survey | Gezond | Mean | Std. Error | 95% Confidence Interval | |
|------------|--------|--------|------------|-------------------------|-------------|
| | | | | Lower Bound | Upper Bound |
| HCgezond | 1 | 53,703 | 2,742 | 48,281 | 59,125 |
| | 2 | 50,595 | 3,051 | 44,562 | 56,627 |
| HCongezond | 1 | 59,279 | 2,861 | 53,623 | 64,936 |
| | 2 | 43,618 | 3,183 | 37,325 | 49,910 |

Pairwise Comparisons

Measure: IJs_kopen

| Gezond | (I) Survey | (J) Survey | Mean Difference (I-J) | Std. Error | Sig. ^a | 95% Confidence Interval for Difference ^a | |
|--------|------------|------------|--------------------------|------------|-------------------|--|-------------|
| | | | | | | Lower Bound | Upper Bound |
| 1 | HCgezond | HCongezond | -5,577 | 3,963 | ,162 | -13,412 | 2,258 |
| | HCongezond | HCgezond | 5,577 | 3,963 | ,162 | -2,258 | 13,412 |
| 2 | HCgezond | HCongezond | 6,977 | 4,409 | ,116 | -1,740 | 15,694 |
| | HCongezond | HCgezond | -6,977 | 4,409 | ,116 | -15,694 | 1,740 |

Based on estimated marginal means

a. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Univariate Tests

Measure: IJs_kopen

| Gezond | | Sum of Squares | df | Mean Square | F | Sig. |
|--------|----------|----------------|-----|-------------|-------|------|
| 1 | Contrast | 1102,068 | 1 | 1102,068 | 1,980 | ,162 |
| | Error | 77917,151 | 140 | 556,551 | | |
| 2 | Contrast | 1724,977 | 1 | 1724,977 | 2,504 | ,116 |
| | Error | 96443,897 | 140 | 688,885 | | |

Each F tests the simple effects of Survey within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

Compare healthiness:

Pairwise Comparisons

Measure: IJs_kopen

| Survey | (I) Gezond | (J) Gezond | Mean Difference (I-J) | Std. Error | Sig. ^b | 95% Confidence Interval for Difference ^b | |
|------------|------------|------------|--------------------------|------------|-------------------|--|-------------|
| | | | | | | Lower Bound | Upper Bound |
| HCgezond | 1 | 2 | 3,108 | 3,556 | ,384 | -3,923 | 10,139 |
| | 2 | 1 | -3,108 | 3,556 | ,384 | -10,139 | 3,923 |
| HCongezond | 1 | 2 | 15,662 [*] | 3,710 | ,000 | 8,327 | 22,997 |
| | 2 | 1 | -15,662 [*] | 3,710 | ,000 | -22,997 | -8,327 |

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Multivariate Tests

| Survey | | Value | F | Hypothesis df | Error df | Sig. |
|------------|--------------------|-------|---------------------|---------------|----------|------|
| HCgezond | Pillai's trace | ,005 | ,764 ^a | 1,000 | 140,000 | ,384 |
| | Wilks' lambda | ,995 | ,764 ^a | 1,000 | 140,000 | ,384 |
| | Hotelling's trace | ,005 | ,764 ^a | 1,000 | 140,000 | ,384 |
| | Roy's largest root | ,005 | ,764 ^a | 1,000 | 140,000 | ,384 |
| HCongezond | Pillai's trace | ,113 | 17,822 ^a | 1,000 | 140,000 | ,000 |
| | Wilks' lambda | ,887 | 17,822 ^a | 1,000 | 140,000 | ,000 |
| | Hotelling's trace | ,127 | 17,822 ^a | 1,000 | 140,000 | ,000 |
| | Roy's largest root | ,127 | 17,822 ^a | 1,000 | 140,000 | ,000 |

Each F tests the multivariate simple effects of Gezond within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

Pairwise comparisons for objective ambivalence for ice cream

Compare survey:

Estimates

Measure: MEASURE_1

| Survey | Gezond | Mean | Std. Error | 95% Confidence Interval | |
|------------|--------|--------|------------|-------------------------|-------------|
| | | | | Lower Bound | Upper Bound |
| HCgezond | 1 | 28,797 | 6,243 | 16,455 | 41,139 |
| | 2 | 45,081 | 7,059 | 31,126 | 59,036 |
| HCongezond | 1 | 36,912 | 6,512 | 24,037 | 49,787 |
| | 2 | 24,603 | 7,364 | 10,045 | 39,161 |

Pairwise Comparisons

Measure: MEASURE_1

| Gezond | (I) Survey | (J) Survey | Mean Difference (I-J) | Std. Error | Sig. ^b | 95% Confidence Interval for Difference ^b | |
|--------|------------|------------|-----------------------|------------|-------------------|---|-------------|
| | | | | | | Lower Bound | Upper Bound |
| 1 | HCgezond | HCongezond | -8,114 | 9,021 | ,370 | -25,949 | 9,721 |
| | HCongezond | HCgezond | 8,114 | 9,021 | ,370 | -9,721 | 25,949 |
| 2 | HCgezond | HCongezond | 20,478 [*] | 10,200 | ,047 | ,312 | 40,645 |
| | HCongezond | HCgezond | -20,478 [*] | 10,200 | ,047 | -40,645 | -,312 |

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Univariate Tests

Measure: MEASURE_1

| Gezond | | Sum of Squares | df | Mean Square | F | Sig. |
|--------|----------|----------------|-----|-------------|-------|------|
| 1 | Contrast | 2333,309 | 1 | 2333,309 | ,809 | ,370 |
| | Error | 403729,430 | 140 | 2883,782 | | |
| 2 | Contrast | 14860,496 | 1 | 14860,496 | 4,030 | ,047 |
| | Error | 516187,793 | 140 | 3687,056 | | |

Each F tests the simple effects of Survey within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

Compare healthiness:

Pairwise Comparisons

Measure: MEASURE_1

| Survey | (I) Gezond | (J) Gezond | Mean Difference (I-J) | Std. Error | Sig. ^b | 95% Confidence Interval for Difference ^b | |
|------------|------------|------------|-----------------------|------------|-------------------|---|-------------|
| | | | | | | Lower Bound | Upper Bound |
| HCgezond | 1 | 2 | -16,284 [*] | 7,315 | ,028 | -30,746 | -1,821 |
| | 2 | 1 | 16,284 [*] | 7,315 | ,028 | 1,821 | 30,746 |
| HCongezond | 1 | 2 | 12,309 | 7,631 | ,109 | -2,778 | 27,396 |
| | 2 | 1 | -12,309 | 7,631 | ,109 | -27,396 | 2,778 |

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Multivariate Tests

| Survey | | Value | F | Hypothesis df | Error df | Sig. |
|------------|--------------------|-------|--------------------|---------------|----------|------|
| HCgezond | Pillai's trace | ,034 | 4,955 ^a | 1,000 | 140,000 | ,028 |
| | Wilks' lambda | ,966 | 4,955 ^a | 1,000 | 140,000 | ,028 |
| | Hotelling's trace | ,035 | 4,955 ^a | 1,000 | 140,000 | ,028 |
| | Roy's largest root | ,035 | 4,955 ^a | 1,000 | 140,000 | ,028 |
| HCongezond | Pillai's trace | ,018 | 2,602 ^a | 1,000 | 140,000 | ,109 |
| | Wilks' lambda | ,982 | 2,602 ^a | 1,000 | 140,000 | ,109 |
| | Hotelling's trace | ,019 | 2,602 ^a | 1,000 | 140,000 | ,109 |
| | Roy's largest root | ,019 | 2,602 ^a | 1,000 | 140,000 | ,109 |

Each F tests the multivariate simple effects of Gezond within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic