The effect of using E-numbers or colloquial additive names on the consumption intention.

Master thesis

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Abstract

The number of additives used in food products has increased during the 20th century. Whether these additives were safe was not always clear, this lead to legislation and listing of these additives by the European Union starting in 1962. These listings developed into the E-numbers we now know. These E-numbers are seen as more unnatural then colloquial additive names. Consumers have shown a higher preference for natural food additives, thus they should prefer additives being named by their colloquial name instead of their E-number. The aim of this research was to determine the difference in consumption intention when using E-numbers compared to Colloquial additive names. In this research a 2 (Stevia vs Aspartame) within x 2 (E-number vs Colloquial) between x2 (benefit information vs no benefit information) between participants full factorial design was used. This resulted in the group of 165 respondents being divided in four groups, that all were shown 2 advertisements.

Results have shown that using E-numbers instead of colloquial additive names leads to a higher difficulty to recognize additives and a lower perceived naturalness. Although it seems that for Aspartame it does not matter whether an E-number or colloquial name is used since both are seen as equally unnatural. A higher difficulty of recognizing additives leads to a lower perceived control of that additive's risks. Furthermore it has no effect on perceived benefits and it leads to an increase in perceived risks. The perceived control of an additive's risks has no effect on the perceived risks. Moreover the perceived naturalness has a negative effect on the perceived risks and a positive effect on the perceived benefits. Furthermore using benefit information shows no effect of perceived risks and perceived benefits. Finally the perceived benefits seem to have no effect on the consumption intention whereas the perceived risks have a negative effect. Overall it seems that using either E-numbers or Colloquial additive names has no effect on the consumption intention. Nevertheless it is recommended for companies to use colloquial additive names in some cases since they can be seen as more natural, although research is required to determine for which additives this is the case. Future research towards understanding the effects of using E-numbers or colloquial names on consumption intention is needed. If this research is repeated for sweeteners it is recommended to add diet groups and sugar into this research, furthermore a more extended benefit information message should be used.

Introduction

Conserving food and adding flavour has been done by mankind for as long as we know, but in the last century more and more synthetic and natural additives have been discovered and used (European commission, 2007). These natural additives are extracted from plant or animals and can therefore be called natural, synthetic additives are produced in factories (Voedingscentrum, 2015). Because of the increase in additives it was becoming unclear for consumers which of these additives were safe and which were not. Because of this the European Union made legislation on food additives. They started with listing different groups of additives starting with colours (1962), preservatives (1964), antioxidants (1970) and gelling agents, emulsifiers, thickeners and stabilisers (1970) (Jukes, 2013). Every separate additive received its own E-number in this list, these E-numbers indicate that the additive has been found safe and approved by the European Food Safety Authority. However this was not yet fully harmonised, until 1990 when this list was harmonised at European level. Only the additives named on this list may be used in food and only under the strict conditions that have been named, all other substances which fall under the categories in this list are banned from use (European commission, 2007). All these additives have to be mentioned on a product label, either by their E-number or by their colloquial name.

In the last few years more and more people and media openly question the safety and risks of E-numbers. Whether sweeteners and colours add to the hyperactivity of children is an example of this. Another example is the question on whether sweeteners, in particular Aspartame (E951), cause cancer and have a negative effect on weight loss.

Asking questions on whether foods are safe is always good, but it also has its downsides, the negative (media) attention given to additive related food incidents increases the anxiety of certain types of food (additives), this is mostly referred to as "food scares" (Knowles & Moody, 2007). An example of a food scare is the before mentioned attention that Aspartame gets. Because of the food scare created around Aspartame, people see this additive as a risk to their health and start avoiding it, this can result in a decrease of consumption intention depending on the level of trust in the information distributor (Mazzocchi, Lobb, Triall, & Alessio, 2008). Looking at the U.S. sales figures in 2012, the sales in diet sodas have dropped significantly more than the sales in regular sodas (USA TODAY, 2013). This drop in sales could be caused by the food scare around artificial sweeteners like Aspartame that are used in these products.

The controversies on the sugar substitutes revolve around the exact benefits and probable risks. The most commonly known benefit is the assistance in weight loss, although some consumers believe that artificial sweeteners have the opposite effect, this however has not yet been proven (Tandel, 2011). Other benefits of artificial sweeteners are that they are good for dental care, since the dental decay is lower when replacing sugar with sweeteners. Furthermore the use of sweeteners can help diabetes patients with controlling their blood sugar level. Next to that of course there are the advantages of production costs and enhanced flavour. On the other hand there are the probable risks, as said there is the gaining of weight, causing cancer or tumors and many more health hazards.

These are called probable risks because they have been proven on animals but have yet to be proven on humans (Tandel, 2011). This however raises the interesting question why people still consume these sweeteners even though there are signs of these hazards.

Research in Australia has shown that using E-numbers instead of the colloquial additive name makes consumers perceive the product as less natural (Evans, de Challemaison, & Cox, 2010). People with high modern health worries, including food worries, have shown to have a higher preference for natural food additives compared to synthetic additives (Devcich, Pederson, & Petrie, 2007). This infers that they are more likely to prefer products when the colloquial name of the additive is used instead of the E-number. A higher preference infers that consumers prefer a certain product more over another and therefore have a higher intention of buying this specific product.

The aim of this study is to investigate the difference in the consumption intention when E-numbers or colloquial additives names would be used. In this study the main research question is: "*What is the difference in consumption intention when using the colloquial additive name compared to the E-number belonging to that additive?*" To help answer this question it is important to know *"What determinants play a role in determining the potential difference in consumption intention when comparing colloquial additive names to E-numbers?*"

Theoretical background

The most important thing is to understand consumption intention. In consumption intention a couple of factors play an important role: information, perceived control, perceived difficulty of recognition, perceived naturalness and the risk and benefit perception. The theoretical background helps to explain these and place them into a model.

To understand if and how consumption intention differs between using colloquial additive names or E-numbers, it is important to understand consumption intention and determine which factors play an important role in consumption intention. Behavioural intentions and thus consumption intentions are developed by attitudes (Ajzen, 1991).

Risk & Benefit perception

Attitudes are formed by beliefs about a certain outcome and the evaluation of this outcome. It is found that when beliefs are evaluated as negative (a certain action seems to have a negative consequence) and the consequence (the evaluation) seems to be negative, the attitude toward that type of behaviour is negative (Ajzen & Fishbein, 1980).

It can be stated that these attitudes are composed of perceived risks and perceived benefits, because a risk and a benefit is an outcome of a certain action. If a risk or benefit is perceived it will be evaluated accordingly. This means that the perceived risk or perceived benefit is the combination of a certain outcome and its evaluation. Which would logically mean that perceived risks and perceived benefits also influence consumption intention directly, which has been found true by Parson et. Al (Parson, Siegel, & Cousins, 1997). Therefor we expect that benefits have a positive effect on consumption intention whereas risks have a negative effect on consumption intention.

This leads to the following hypothesis:

Hypothesis 1: If the perceived risks of an additive increase, the consumption intention of a product containing that additive decreases.
Hypothesis 2: If the perceived benefits of an additive increase, the consumption intention of a product containing that additive increases.

In the case of additives, consumers get information from news, friends or other sources about how good or bad these additives are, this type of information helps form informational beliefs. (Ajzen & Fishbein, 1980). When this information is given by a credible (trusted) person the message is more likely to be accepted as true, by being accepted this information helps form a belief (Perloff, 2010). This means that if a credible source gives information to a consumer that tells him that aspartame causes cancer, he will believe this to be true and thus form attitudes in line with this belief and the evaluation of this belief.

The level of risk perception is directly affected by the trust placed in the informer, this is closely related to how consumers form beliefs (Mazzocchi et al., 2008). Thus when false information is accepted as true (because the source is trusted) the total risk perception might be false as well. This

means that in the aspartame-cancer issue, consumers will see products containing aspartame as a greater risk to their health then when the message is rejected. Important to know here is that sources giving us bad news are often seen as more credible than those that bring good news (Slovic, 1999), this infers that negative beliefs are easier formed.

If we link this to beliefs it might be inferred that consumers form the belief that a certain product choice has certain risks, which in turn have a negative effect on the outcome. Therefore consumers might form a negative attitude towards the product (Ajzen & Fishbein, 1980). In the case of aspartame this might also form a negative attitude towards the product, however as far as research has shown aspartame does not cause cancer (Kushi et al., 2006; Marinovich, Galli, Bosetti, Gallus, & Vecchia La, 2013). Which could mean that when consumers accept incorrect information or have incorrect knowledge this leads to false beliefs and evaluations which in turn lead to different attitudes, in this case that would mean that there are different perceived risks and benefits.

False information can lead to different perceived risks and benefits and thus to different risk behaviour. Research from Rohrmann in 1999 shows us that two important factors play a role in risk behaviour: the potential harms of certain behaviour but also the benefits that come along with the behaviour (Rohrmann & Huichang, 1999). Further research shows that the information on risks and benefits has a significant influence on the perceived risks and benefits. When the information would tell consumers that a certain additive has a lot of benefits they will infer that the risks of the additive are lower, but when the information on risk is high they infer that the benefit is low. This goes the same when there is no or little information on risks or benefits (Finucane, Alhakami, Slovic, & Johnson, 2000). Added to this the trust one places in the messenger plays a great role in the perceived benefits and perceived risks as well. When the trust in the messenger is high the perceived benefits are greater when a benefit is being communicated, and the perceived risk decreases (Siegrist, Cvetkovich, & Roth, 2000).

This leads us to the following hypothesis:

Hypothesis 3: If benefit information about the consumption of an additive is given, the perceived benefits of that additive increases.
Hypothesis 4: If benefit information about the consumption of an additive is given, the perceived risks of that additive decreases.

Some risks of additives, mainly sweeteners, have already been stated, but benefits are just as important, since they play an important role in forming benefit perception. Health benefits that come with the additives are an example of these benefits. For example artificial sweeteners are famous for having the same taste effect as sugar but reducing the energy value compared to sugar, this leads to help with weight loss (Bellisle & Drewnowski, 2007). But it can also help regulate the blood sugar levels and thus help diabetes patients (Zygler, Wasik, & Namiesnik, 2009).

Understanding and perceiving additives

There are two dimensions that play a major role in influencing risk behaviour; how known a risk is to the person exposed to it and how controllable a risk is (Slovic, 1987). As explained information plays a role in the forming of beliefs, a part of this information comes forth from prior knowledge. A risk on

which none or no correct knowledge exists can be perceived as a worse risk (Siegrist, Keller, & Kiers, 2006; Slovic, 1987; Sparks & Shepherd, 1994). Before the knowledge on a certain additive is triggered the additive has to be recognized, the difficulty of recognizing an additive and thus its risks and benefits will be named the perceived difficulty of recognition. If the difficulty is high the additive is harder to recognized, because no knowledge is triggered the perceived risk will increase. On the other side, the perceived benefits will decrease when the difficulty is high.

In the case of additives knowledge can be triggered by a name, this can be either an E-number or a colloquial name, the number or name given can be seen as a type of information. This means information has an influence on the perceived difficulty of recognition. Research indicates that consumers do not correctly recognize these E-numbers (Paans, 2013). This is in line with the fact that knowledge of our food has decreased through the years (Dixon, 2007; Tannahil, 1988) cited in (Buchler, Smith, & Lawrence, 2010). Thus if an E-number is given instead of a colloquial it will be less likely that the additive is recognized. Meaning that when an E-number is used the perceived difficulty of recognition increases.

This leads to the following hypotheses:

Hypothesis 5: If the perceived difficulty of recognition of an additive increases, the perceived risks of that additive increases.
Hypothesis 6: If the perceived difficulty of recognition of an additive increases, the perceived benefits of that additive decreases.
Hypothesis 7: If E-numbers are used instead of colloquial names, the perceived difficulty of recognition increases.

The second dimension that plays a role in influencing risk behaviour is the controllability (Slovic, 1987). This means that a consumer has control over risks that are induced when consuming or using a product, the amount of control a consumer feels he has over the risk can be called the perceived control. Thus it can be said that perceived risks and perceived control are closely related (Fischhoff, Slovic, & Lichtenstein, 1978). This can also be derived from research done by Slovic and Siegrist et al., when a consumer feels he has more control over something he feels that the risks involved are lower (Siegrist et al., 2006; Slovic, 1987). Thus it can be inferred that if the perceived control is higher, the perceived risks will decrease.

To have control over a risk, one must first know what risk he is facing. This means an additive has to be communicated and recognized before a consumer can determine the control he or she has over the risks that are induced when consuming a certain additive. Therefore it can be assumed that when the perceived difficulty of recognition is high the perceived control is low, because the consumer does not know what risks he is facing and thus has no control over these risks.

This lead to the following hypotheses:

Hypothesis 8: If the perceived difficulty of recognition of an additive increases, the perceived control of that additive's risks decreases.
Hypothesis 9: If the perceived control of additive effects increases, the perceived risks of that additive decreases.

When considering additives, artificial sweeteners are perceived by consumers as a risk that is new and unknown but controllable (Slovic, 1987). However it can be argued whether sweeteners nowadays are still perceived as a real "new" risk. In a study in conducted by Siegrist in 2006, which uses a similar model, artificial sweeteners have already moved more towards known risks (Siegrist et al., 2006). Considering it would still be perceived as something "new" it can be argued whether neophobia plays a role in the actual usage of sweeteners. When neophobia does play a role this would mean that consumers would avoid the consumption of products with artificial sweeteners because they are afraid that the food might be harmful to them (Rozin, 1997; Stallberg-White & Pliner, 1999).

The question whether E-numbers or colloquial additive names should be used also comes forth in the perceived naturalness of an additive. It has already been proven that using E-numbers instead of colloquial names makes a consumer perceive the product as less natural (Evans et al., 2010). When looking at genetically modified foods it is shown that product that are perceived as more natural are more likely to be accepted then genetically modified foods that are not perceived as natural (Tenbült, de Vries, Dreezens, & Martijn, 2005). From this it can be implied that the perceived naturalness has an influence on the perceived risks and benefits of foods. In a research conducted by Siegrist and colleagues, on nanotechnology foods this has been shown true, perceived risks and benefits are influenced by the naturalness of foods (Siegrist, Stampfli, Kastenholz, & Keller, 2008).

We therefore presume that a food product that is perceived as more natural has more perceived benefits and less perceived risks.

This leads to the following hypotheses:

Hypothesis 10: If E-numbers are used instead of colloquial names, the perceived naturalness of that additive decreases.
Hypothesis 11: If a food additive is perceived as more natural, the perceived risks of that additive decreases.
Hypothesis 12: If a food additive is perceived as more natural, the perceived benefits of that additive increases.

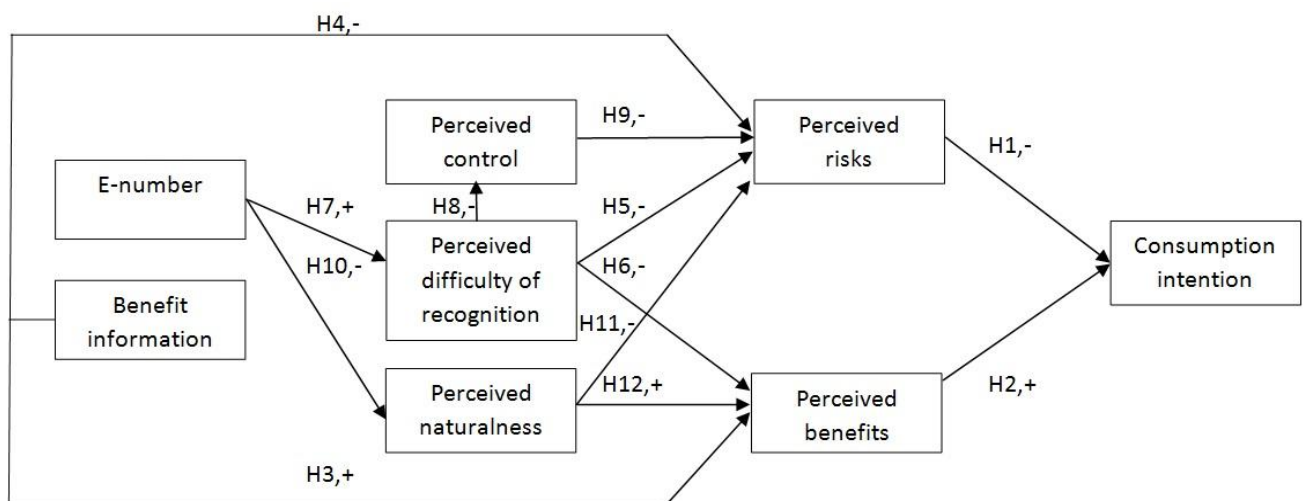From the presented research the following model is suggested:

Figure 1: The suggested model

Methodology

Operationalization

In this study a 2 (Stevia vs Aspartame) within x 2 (E-number vs Colloquial) between x2 (benefit information vs no benefit information) between participants full factorial design was used. This resulted in four groups of participants that all received two scenarios. Each of these groups were shown a script with information, this script was slightly different for every group. The "information" given to the participants in these scripts was changed on two factors. The first factor is the use of an E-number or a colloquial additive name. To control the potential bias consumer might have towards a certain additive name, two different additive names and their associated E-numbers were used. Because we wanted to test the naturalness of the additive the choice was made to use aspartame and stevia, which is promoted as a natural sweetener. This factor was used to measure three determinants that can be found in the model: "Perceived difficulty of recognition", "Perceived control" and "Perceived naturalness", the literature states that both of these are influenced by the use of either an E-number or a colloquial additive name.

The second factor was benefit information, this factor was given two levels, either benefit information is given or no information is given. This factor was used to manipulate33 the determinants "Perceived risks" and "Perceived benefits".

For the experiment eight versions of the following script was used as an advertisement:

*Coca-Cola is proud to present a new soda drink. **This soda contains E951**, which will help prevent obesity because it contains zero calories!*
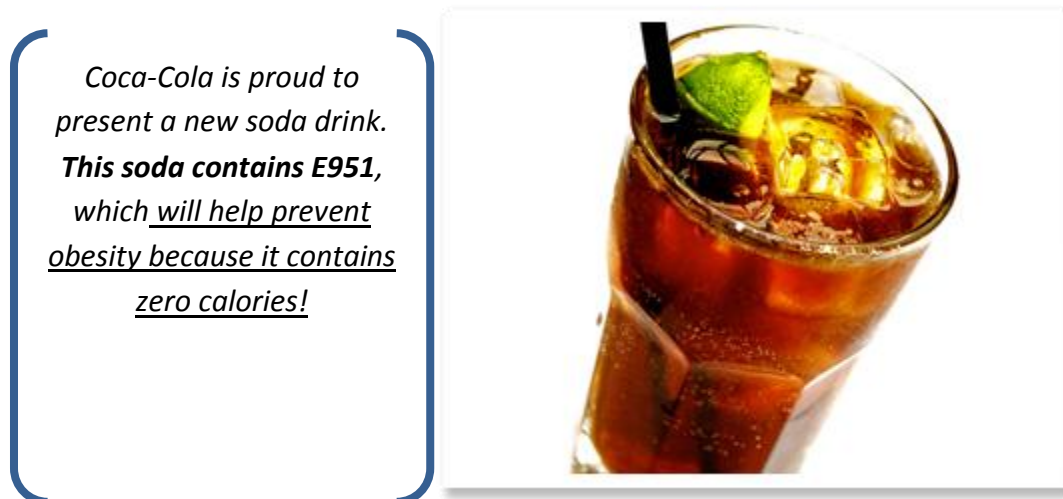
Figure 2: The advertisement script

In the script the bold part was either:

- This soda contains E951. (this is the E-number associated with Aspartame)
- This soda contains Aspartame.

- This soda contains E960. (this is the E-number associated with Stevia)
- This soda contains Stevia.

The underlined part was either:

- Which will help prevent obesity because it contains zero calories!
- No benefit will be mentioned (in this condition the text was left blank).

Pre-test

To determine which brand had to be used in the script a pre-test was conducted. The main goal of this was to determine which brand would be best concerning trust. It has been chosen to measure this because in the theoretical background it becomes clear that trust can have a big influence on how a message is perceived. It was therefore important to find a brand that fluctuates as little as possible regarding trust.

For measuring trust questions regarding ability, benevolence and integrity was used. Ability is a group of skills, competencies and characteristics a company has, benevolence focuses on to what extend the trusted company is believed to do good for the consumer. Whereas integrity focuses on the principles of the trusted company and to what extend the consumer finds these principles acceptable (Mayer & Davis, 1999). Mayer & Davis (1999), use a set of questions regarding these two areas, these questions are measured on a five point scale ranging from 1=disagree strongly to 5=agree strongly. This scale was changed to a seven point scale anchored at 1=disagree strongly to 7=agree strongly. Two ability questions will be used: "Top management is known to be successful at the things it tries to do" and "Top management has much knowledge about the work that needs done." These were rewritten to: "[Brand] is known to have successful soda drinks" and "[Brand] has much knowledge on soda drinks." The questions that have been used regarding benevolence are: "Top management is very concerned about my welfare", "My needs and desires are very important to top management" and "Top management would not knowingly do anything to hurt me." These were rewritten to the following questions: "[Brand] is very concerned about my welfare", "My needs and desires are very important to [Brand]" and "[Brand] would not knowingly do anything to hurt me." The questions that has been used regarding integrity are: "I like top management's values" and "Sound principles seem to guide top management's behaviour." These were rewritten to the following questions: "I like [Brand]'s values" and "Sound principles seem to guide [Brand]'s behaviour."

Added to these questions were a couple of extra questions to distract from the main goal of measuring trust and to check how known a brand was to the respondent. During this pre-test the following questions were asked on a seven-point Likert scale, with the leftmost point "Strongly disagree" and the rightmost point "Strongly agree".

- [Brand] delivers high quality.
- [Brand] is cheap.
- [Brand] is known to me.
- [Brand] is known to have successful soda drinks.
- [Brand] has much knowledge on soda drinks.

- [Brand] is very concerned about my welfare.
- My needs and desires are very important to [Brand].
- [Brand] would not knowingly do anything to hurt me.
- I like [Brand's] values.
- Sound principles seem to guide [Brand's] behaviour.
- [Brand] is expensive.
- Nationality.

In the pre-test "[Brand]" was replaced by a brand name. The following four brands have been tested, Coca-Cola, Pepsi, Schweppes, Royal club.

The pre-test was conducted in the cafetaria of the Leeuwenborch and had a total of 20 respondents, each respondent was shown two brands.

During the analysis of the pre-test results the focus was on two areas, a brand had to be known and the trust should be a stable as possible. At first knowledge was tested, because without brand knowledge the trust factors are hard to determine. Pepsi and Coca-Cola scored well, whilst Royal Club and Schweppes scores varied. Therefore the decision was made that the two latter brands would be left out for the analysis of the second area. In this area Coca-Cola scored the best since it had the most stable scores, therefore Coca-Cola was used as the example brand in this research.

Main study

Measurement of factors

For measurement of the consumption intention and the other factors, which are shown in the model, a questionnaire was used. For the different factors the questions used in different sorts of researches have been used. The decision was made to use a seven point scale for measuring all factors. For the factors the following questions were used:

Perceived difficulty of recognition

Trafimow uses perceived difficulty which has a comparable definition to the used perceived difficulty of recognition. He uses a single item measurement using the following question: "How much would completing the race be easy to do?" For this research the question was adapted to the recognition of additives, changing the questions to the following: "How difficult is recognising the risks and benefits of [Additive] for you?", in which [Additive] was replaced by the additive name or E-number used in script. For measuring this Tramifow uses a four point scale from 0 to 4 differing from 0=Not at all easy to 4=Extremely easy (Trafimow, Sheeran, Conner, & Finlay, 2002). This was adapted to a seven point scale anchored at 1=not difficult at all and 7=very difficult.

Perceived control

Fischhoff and colleagues (1978) measures the control over a risk by using the following question: "If you are exposed to the risk of each activity or technology to what extent can you, by personal skill or

diligence, avoid death while engaging in the activity?" Whilst using a 7-point scale which is anchored at 1=uncontrollable and 7=controllable. The question was rephrased to the following: "When consuming [Additive], to what extend can you, by personal skill or effort, avoid risks induced by consuming [Additive]?", in this question [Additive] was replaced by the additive name or E-number used in the script.

Perceived naturalness

Tenbült et al. (2005) used a five point scale 1 (totally disagree) to 5 (totally agree), on which she asks the simple question "I believe bread is natural", she thereby replaces bread by the product asked to imagine by the respondent at that time. These were rewritten to: "How natural do you believe [Additive] to be?" Also the scale was changed to a seven point scale that was anchored at 1=very unnatural and 7= very natural.

Perceived risks & Perceived benefits

Since the risks and benefits of additives are mainly focussed on health, the questions asked were related to them. Van Dijk et al. (2011) use a seven point scale with 1=very low to 7=very high, the participants were then asked to fill in the scale for the following questions: "The health risks [benefits] associated with eating fatty fish to me personally are" and "The health risks [benefits] associated with eating fatty fish to the average Dutch person are". For this research the questions were rewritten to: "The health risks associated with consuming [Additive] to me personally are", "The health benefits associated with consuming [Additive] to me personally are", "The health risks associated with consuming [Additive] to the average person are" and "The health benefits associated with consuming [Additive] to the average person are", in these questions [Additive] were replaced by the additive name or E-number used in the script.

Consumption intention

For measuring consumption intention and example questionnaire of Icek Ajzen (2014) was used. He uses a single item measurement for the behavioural intention, using the following question: "I intend to attend the meeting of this class on a regular basis", measuring this on a seven point scale ranging from 1=strongly agree and 7=strongly disagree (Ajzen, 2014). The question was changed to "I intend to consume this soda in the future" whilst the scale was anchored at 1=strongly disagree and 7=strongly agree.

Trust

Trust was to be used as a control variable, because we wanted to make sure we could control for fluctuation in trust, which could influence the results. Therefore the question: "Coca-Cola is a brand that can be trusted" was used. The scale was anchored at 1=strongly disagree and 7=strongly agree.

Google

To prevent respondents from using google they were asked at the beginning of the survey to refrain from using google or any other search engine. If respondents would have used a search engine the information gained from their search could influence the results, because they would be able to understand an E-number or colloquial name that they normally would not be able to understand. Since this was a self administered survey it was important to check whether respondents used google or any search engine, this is why the question: "Please indicate if you used google or any other search engine during this questionnaire" was added to the questionnaire, with the possible answers "yes" or "no".

To determine the order of the questions the order of the model was used with an exception of "trust" since this determinant was used as a control variable. This brings us to the following order:

- Perceived difficulty of recognition.
- Perceived control.
- Perceived naturalness
- Perceived risks.
- Perceived benefits.
- Consumption intention.
- Trust
- Google
- General questions.

Data analysis

Data has been analyzed using regression analysis using unstandardized Beta's, the significance threshold was set at p=0.05. Furthermore Aspartame and Stevia have been treated as independent respondents during the data analysis. For testing scale reliability the Cronbach's α threshold was set at α=0.7. To determine whether the R^2 had a small (R^2 between 0.01 and 0.09), medium, (R^2 between 0.09 and 0.25) or large (R^2 larger than 0.25) explanatory value Cohen (1992) was used.

Results

Descriptive statistics

After running for approximately two weeks there were 165 respondents who filled in the questionnaire, most of these were obtained by Facebook groups related to Wageningen University. All respondents got a balanced randomized version of the questionnaire, of the 165 respondents 100(60.6%) completed the questionnaire. Out of the 165 respondents 84 were shown colloquial names and 81 were shown E-numbers, of the completed questionnaires 60(60%) were shown colloquial names and 40(40%) were shown E-numbers. Dropout's for colloquial names were 24 (28.6%, N=84) and for E-numbers 41 (50.6%, N=81). Respondents that were shown E-numbers were more likely to stop the survey compared to those that were shown colloquial names (Chi-Square (1)=8.394, p=.004, Cramers V=.226).

Of the 100 completed questionnaires 37 (37%) respondents were men and 62 (62%) 1 person did not fill in their gender, the average age was 25.5(Std. dev=7.009) with a span of 15 to 57 years. In table 1 an overview of which different combinations of colloquial/E-number and Benefit/No benefit information and Stevia or Aspartame first were shown to the respondents that completed the questionnaire.

Table 1: Participants per condition		Information	
		No benefit information	Benefit information
Colloquial name	Stevia first	16	12
	Aspartame first	15	17
	Total	31	29
E-number	Stevia first	13	13
	Aspartame first	7	7
	Total	20	20
Total	Stevia first	29	25
	Aspartame first	22	24
	Total	51	49

We checked whether the order effect (Aspartame or Stevia was shown to the respondent first) had moderating effects. First we estimated the base relations, then we looked at whether adding the order effect and its interaction with the other determinants resulted in significant Fchange in a hierarchical regression analysis (table 2). Only for perceived benefits this mattered, however it only mattered for the main effect (t(7,192)=2.083, p=.039).

Table 2: Influence of Aspartame or Stevia first on the tested hypotheses		
	Fchange (df)	P
The effect of perceived risks (H1) and benefits (H2) on consumption Intention.	.467 (3,194)	.706
The effect of benefit information (H3), perceived difficulty of recognition (H6) and perceived naturalness (H12) on the perceived benefits.	2.711(4,192)	.031
The effect of benefit information (H4), perceived difficulty of recognition (H5), perceived control (H9) and perceived naturalness (H11) on the perceived risks.	1.349(5,190)	.245
The effect of using E-numbers or colloquial names on the perceived difficulty of recognition (H7).	.873(2,196)	.419
The effect of the perceived difficulty of recognition on the perceived control (H8).	.524(2,196)	.593
The effect of using E-numbers or colloquial names on the perceived naturalness (H10).	2.143(2,196)	.120

At the end of the questionnaire respondents were asked whether they used Google or any other search engine, 97 of the respondents that answered this question, 84 reported that they did not use Google or any search engine during this questionnaire, whilst 13 reported they did. Of the people that did 6 saw colloquial names and 7 saw E-numbers. No evidence was found that the use of E-numbers instead of colloquial names had any effect on the use of a search engine (Chi-Square (1) =1.162, p=.281). Since these results are not significant they have not been included in further discussion.

The risk and benefit perception were both multiscale items consisting of two items, risk/benefit personal and risk/benefit on average person. To test if they measure the same construct a reliability test was done looking for high correlation between the two items and Cronbach's α. For the Aspartame perceived risks a combination can be made (Cronbach's α=.856, r=.763), for Stevia this can also be done (α=.930, r=.870). For Aspartame perceived benefits the combination can also be made (α=.850, r=.874), for Stevia this is also be done (α =.908, r=.831).

In table 3 an overview is given of the average scores of the respondents on the measured variables.

Table 3: Mean (SD) of the measured variables (N=100)				
	Consumption intention	Perceived Benefits	Perceived Risks	Perceived difficulty of recognition
Aspartame	2.77 (1.94)	2.67 (1.36)	4.46 (1.50)	4.17 (2.08)
Stevia	3.02 (1.88)	3.20 (1.36)	3.45 (1.53)	4.69 (1.96)
	Perceived control	Perceived Naturalness	Trust in Brand	
Aspartame	3.50 (1.88)	2.16 (1.19)	3.49 (3.62)	
Stevia	3.43 (1.77)	3.78 (1.92)	3.64 (3.54)	

Table 4 gives an overview of the reported scores in consumption intention when looking at the use of e-numbers of colloquial names.

Table 4: Mean (SD) of the Consumption intention for colloquial names (N=60) and E-numbers (N=40)		
		Consumption intention
Aspartame	Colloquial name	2.73 (2.02)
	E-number	2.82 (1.85)
Stevia	Colloquial name	3.08 (1.93)
	E-number	2.93 (1.83)
Total	Colloquial name	2.91 (1.98)
	E-number	2.87 (1.83)

Hypothesis testing

The effect of perceived risks (H1) and benefits (H2) on consumption intention.

A multiple linear regression model showed that consumption intention can be predicted by perceived risks and perceived benefits, although the explanatory value is small (F(2,197)=4.726, p=.010, R^2=.046). When looking at the individual variables we see that perceived risks have a negative effect on consumption intention (b=-.256, t(197)= -3.000, p=.003). Perceived benefits show no effect on consumption intention (b= .002, t(197)=.017, p= .986). The effect of perceived risks and perceived benefits is no different between Stevia and Aspartame as shown by the non-significant added interaction (Fchange(3,194)=.914, p=.435). For the hypothesis this means that as hypothesized, the perceived risks of an additive have a negative effect on the consumption intention of a product containing that additive. Furthermore no evidence was found that the perceived

benefits of an additive have an effect on the consumption intention of a product containing that additive.

The effect of benefit information (H3), perceived difficulty of recognition (H6) and perceived naturalness (H12) on the perceived benefits.

A multiple linear regression model showed that the perceived benefits of an additive can be predicted by perceived difficulty of recognition of an additive, benefit information and perceived naturalness, although the explanatory value is small ($F(3,196)=5.999$, $p=.001$, $R^2 = .084$.) When looking at the individual variables we see that perceived naturalness has a positive effect on the perceived benefits ($b=.224$, $t(196)= 4.170$, $p=.000$). Perceived difficulty of recognition of an additive shows no effect on the perceived benefits ($b= .021$, $t(196)=.444$, $p= .657$). Benefit information shows no effect on the perceived benefits ($b=-.056$, $t(196)=-.291$, $p=.771$). The effect of benefit information, perceived difficulty of recognition and perceived naturalness on the perceived benefits is no different between Stevia and Aspartame as shown by the non-significant added interaction ($Fchange(4,192)=1.037$, $p=.390$). For the hypothesis this means that no evidence was found that benefit information on the consumption of an additive has an effect on the perceived benefits of that additive. Furthermore no evidence was found that the perceived difficulty of recognition of an additive has an effect on the perceived benefits of that additive. As hypothesized the perceived naturalness of an additive has a positive effect on the perceived benefits of that additive.

The effect of benefit information (H4), perceived difficulty of recognition (H5), perceived control (H9) and perceived naturalness (H11) on the perceived risks.

A multiple linear regression model showed that the perceived risks of an additive can be predicted by benefit information, perceived difficulty of recognition of an additive, perceived control of additive effects and perceived naturalness, with a large explanatory value ($F(4,195)=20.331$, $p=.000$, $R^2 = .294$.) When looking at the individual variables we see that perceived difficulty of recognition of an additive shows a positive effect on the perceived risks ($b= .137$, $t(195)=2.752$, $p= .006$). Perceived naturalness shows a negative effect on the perceived risks ($b=-.419$, $t(195)= -7.690$, $p=.000$). Benefit information shows no effect on the perceived risks ($b=-.008$, $t(195)=-.042$, $p=.966$), perceived control of additive effects also show no effects on the perceived risks ($b=-.078$, $t(195)=-1.410$, $p=.160$). The effect of benefit information, perceived difficulty of recognition, perceived control and perceived naturalness on the perceived risks is no different between Stevia and Aspartame as shown by the non-significant added interaction ($Fchange(5,190)=1.667$, $p=.144$). For the hypothesis this means that no evidence was found that benefit information on the consumption of an additive has an effect on the perceived risks of that additive. As hypothesized the perceived difficulty of recognition of an additive has a positive effect on the perceived risks of that additive. No evidence was found that the perceived control of additive effects has an effect on the perceived risks of that additive. Furthermore as hypothesized the perceived naturalness of an additive has a negative effect on the perceived risks of that additive.

The effect of using E-numbers or colloquial names on the perceived difficulty of recognition (H7).

A linear regression model showed that the perceived difficulty of recognition of an additive can be predicted by the use of colloquial names or E-numbers, with a medium explanatory value ($F_{(1,198)}$=20.238, p=.000, R^2 = .093). A positive effect of using an E-number instead of colloquial names on perceived difficulty of recognition of an additive was shown (b=1.263, $t_{(196)}$=4.499). The effect of using colloquial names or E-numbers on the perceived difficulty of recognition is no different between Stevia and Aspartame as shown by the non-significant added interaction ($F_{change(2,196)}$=1.816, p=.165). For the hypothesis this means that as hypothesized using E-numbers instead of colloquial names has a positive effect on the perceived difficulty of recognition.

The effect of the perceived difficulty of recognition on the perceived control (H8).

A linear regression model showed that the perceived control of an additive's risks can be predicted by the perceived difficulty of recognition of an additive, although the explanatory value is small ($F_{(1,198)}$=19.645, p=.000, R^2 = .086). A negative effect was of the difficulty of recognition of an additive on perceived control was shown (b=-.269, $t_{(198)}$=-4.432). The effect of perceived difficulty of recognition on the perceived control is no different between Stevia and Aspartame as shown by the non-significant added interaction ($F_{change(2,197)}$=.420, p=.658). For the hypothesis this means that as hypothesized the perceived difficulty of recognition has a negative effect on the perceived control.

The effect of using E-numbers or colloquial names on the perceived naturalness (H10).

A linear regression model showed that the perceived naturalness of an additive can be predicted by the use of colloquial names or E-numbers, although the explanatory value is small ($F_{(1,198)}$=44.278, p=.000, R^2 = .065). A negative effect of using an E-number instead of colloquial names on perceived naturalness of an additive was shown (b=-.929, $t_{(198)}$=-3.703). The effect of using E-numbers or colloquial names on the perceived naturalness differs between Stevia and Aspartame as shown by the significant added interaction. ($F_{change(2,196)}$=40.482, p=.000, R^2=.273). For the hypothesis this means that as hypothesized using E-numbers instead of colloquial names has a negative effect on the perceived naturalness of an additive.

Figure 3 shows the interaction effect, it shows us that when using a colloquial name there is a significant difference between Stevia and Aspartame, where Stevia is seen as more natural then Aspartame. When looking at the E-numbers the difference is much lower and almost negligible. Furthermore this shows that for the perceived naturalness of Aspartame it does not matter whether a colloquial name or E-number is used. This is confirmed by the simple effects analysis, which shows that for Aspartame no significant effect on naturalness whether an E-number or colloquial name is used ($F_{(1,196)}$=0.007, p=.934), whereas for Stevia there is a significant effect when using an E-number or a colloquial name ($F_{(1,196)}$=39.401, p=.000).
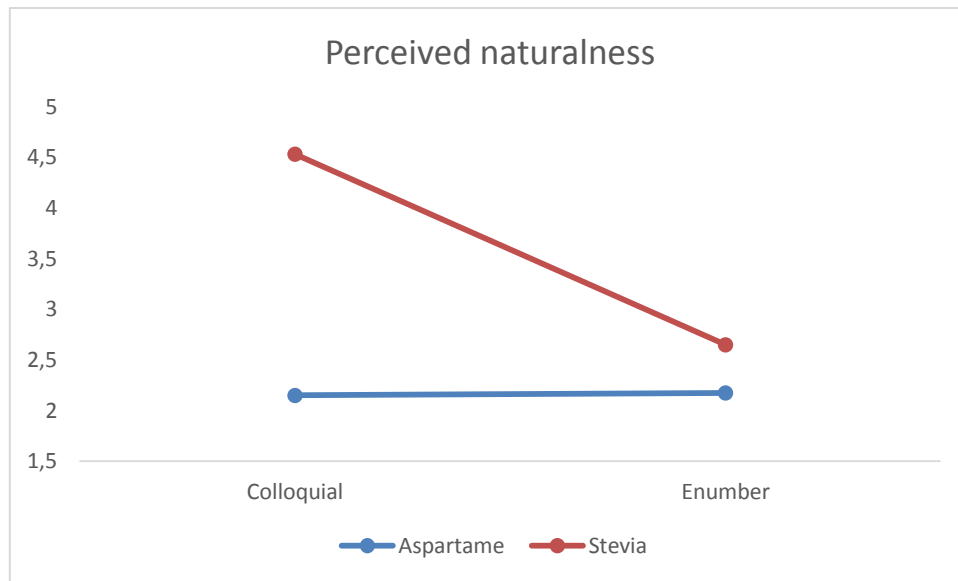
Figure 3: The interaction effect of Stevia vs. Aspartame on perceived naturalness when using E-numbers or colloquial names.

Further testing

After testing our hypothesis we will do some further testing on trust, which was not hypothesised at the start of this study. In the pre-test trust has been tested, because research has shown that if trust in a brand is steady, results should be more stable as well. Therefore a brand with high trust was chosen based on the pre-test results. In table 5 it can be seen that the average trust was neither high nor low, and the standard deviation was almost 2, from this it can be concluded that trust varied in the sample and therefore could have had an influence on the outcome.

Trust.

The current study shows us that benefit information has no effect on perceived risks or perceived benefits. However literature has shown us that trust has an influence on how benefit information is perceived (Mazzocchi et al., 2008). When testing this no difference is found when trust was added, this is shown by the non-significant added interaction (Fchange(3,196)=2.466, p=.118).
A combination of benefit and trust can predict perceived risks as shown by a linear regression model, although the explanatory is small (F(2,197)=6.742, p=.001, R^2=.064). As a main effect trust has a negative effect on perceived risk was shown (b=-.208, t(197)=-3.570, p=.000).

When testing for a main effect of trust on other variables linear regression shows that trust cannot predict perceived benefits(F(1,198)=3.572, p=.060), neither can it predict perceived difficulty of recognition of an additive (F(1,198)=1.687, p=.195). Trust can predict consumption intention (F(1,198)=33.788, p=.000, R^2=.146), having a medium explanatory value. A positive effect on consumption intention was shown (b=.387, t(198)=5.813, p=.000). Furthermore trust can predict perceived naturalness (F(1,198)=15.434, p=.000, R^2=.072), although explanatory value is small. A positive effect on perceived naturalness was shown (b=.255, t(198)=3.929, p=.000). Finally trust can

predict perceived control ($F_{(1,198)}$=4.608, p=.033,R^2=.023), although the explanatory value is small. A positive effect on perceived control was shown (b=.145, t(198)=2.147, p=.033).

Table 5: Statistics for trust		
N	Valid	100
	Missing	0
Mean		3.49
Median		4.00
Std. Deviation		1.904

Discussion

The discussion on whether artificial sweeteners have health risks has been going on for a couple of years now. Add this to a decrease of sales in diet soda's (USA TODAY, 2013) and the fact that people prefer natural products (Devcich et al., 2007) combined with the fact that people see E-numbers as less natural (Evans et al., 2010) have led to the main research question:

What is the difference in consumption intention when using the colloquial additive name compared to the E-number?

This question has been answered by looking at the e-numbers for artificial sweeteners

Determinants of consumption intention

To explain the consumption intention a model has been suggested, which helped answer the sub-research question: *"What determinants play a role in determining the potential difference in consumption intention when comparing colloquial additive names to E-numbers?*

Perceived difficulty & perceived naturalness
The current study has confirmed that perceived difficulty of recognition of an additive is affected positively by the use of an E-number instead of a colloquial name as predicted by the model. This means that when an E-number is presented consumers find it harder to recognize the additive and its risks and benefits of the additive. The use of an E-number instead of a colloquial name was predicted to have a negative effect on the perceived naturalness of an additive, the current study also found this to be true. Furthermore it was found that for the colloquial name Stevia the perceived naturalness was significantly higher than it was for the colloquial name Aspartame compared to the non-significant difference in perceived naturalness when their E-number were used. One reason for this difference could be that consumers did not correctly recognize E-numbers in our study, this idea is supported by Paans (2013) who found that consumers do not correctly recognize E-numbers, further research should confirm this, by focussing on consumers' knowledge of E-numbers and their belonging colloquial names. Another reason could be that Stevia is marketed as a natural sweetener, whilst Aspartame is not.

Perceived control & perceived risks
The perceived difficulty of recognition of an additive was found to have a negative effect on the perceived control of that additive's risks as predicted by the model. The model suggested that perceived risks are predicted by benefit information, perceived control, perceived difficulty of recognition and perceived naturalness. The research has confirmed this, with the model having an large explanatory value (Cohen, 1992). As predicted the perceived difficulty of recognition has a positive effect on the perceived risks, furthermore the perceived naturalness has a negative effect on the perceived risks. It was however predicted that perceived control would have a negative effect on the perceived risks, but no evidence has been found for this. Knowledge beforehand suggested that perceived control would influence perceived risks, which has ultimately led to the formed hypothesis. Based on post hoc inspection of the item for perceived control another possibility came to mind, it might be that the question used for perceived control was too difficult to understand or

comprehend, failure to understand questions correctly can lead to false data (Foddy, 1994). If this failure of understanding the question was present it might explain why no evidence was found for the hypothesized effect. A second explanation for the difference in results could be the group of respondents, the current group existed mainly out of students with no particular view on food or additives. This could mean that they have no real focus on controlling risks that are caused by additives. If this research is to be replicated we would suggest testing the used questions more thoroughly on whether they can be understood properly by the respondents. Furthermore the respondents should be split up in groups, for example people on a diet and non-diet people, this way it can be tested if these differences in background influence the perceived control and with that the effect on perceived risks.

The same goes for the effect of benefit information on perceived risks, it was predicted that benefit information would have a negative effect on perceived risks, but no evidence was found for this hypothesis. The hypothesis was formed because literature suggested that there would be an effect of benefit information on perceived risks. Two factors could have played a major role in benefit information not having an effect. First the benefits of low calories may only be important for people on a diet, we did not look at this nor did we sample on this. Secondly it might be that the benefit information needs to be extended further, at the start of this research there was no evidence that the amount of information had any influence on whether the benefit information would have an effect. Subsequently the benefit information given was very limited, whilst a more extended benefit information message could have been more effective. This is supported by the fact that Finucane et al. used a more extended benefit text in their experiment (2000) and did find an effect.

Perceived benefits

The model suggested that perceived benefits of an additive were predicted by benefit information, the perceived difficulty of recognition of an additive and the perceived naturalness. This has been confirmed by the current study. The model in total can predict the perceived benefits, but this is solely due to the perceived naturalness, the model predicted that the perceived naturalness would have a positive effect on perceived benefits, this was confirmed by the study. No evidence was found for the suggestions that benefit information would have a positive effect on perceived benefits and perceived difficulty of recognition would have a negative effect. The reasons for benefit information not having an effect on perceived benefits are similar to those of it not having an effect on perceived risks: having a group of respondents that were not on diet and providing a too small amount of benefit information.

Consumption intention

Finally the model suggested that the consumption of a product containing a certain additive would be predicted by the perceived risks and perceived benefits. This was found to be true, however it was also found that only perceived risk had the predicted negative effect on consumption intention. The prediction that perceived benefits would have a positive effect on consumption intention was not found to be true. This could have multiple causes, one of them again is the target group being a random group of students, in a diet group the suggested effect might have been found because respondents in a diet group might be more focused on the benefits of a sweetener. Besides this only sweeteners have been measured as an additive, because of this respondents might have been blinded to certain benefits. If sugar would have been added as a third additive consumer might distinguish and recognize benefits of the sweeteners. This in turn might have enlarged the perceived

benefit and with that the effect and significance of perceived benefits on consumption intention. Furthermore the food scares that have been present around sweeteners in the past years might have lead respondents to mainly focus on risks of additives and therefore blinding them to any benefits in additives. If this research were to be repeated in the future we would suggest taking a diet group of respondents and a control group as mentioned before. Furthermore sugar should be added, this can prevent blindness to certain benefits sweeteners have. Besides preventing blindness it can also function as a control, we presume sugar to have different perceived benefits and risks than sweeteners. Having sugar in the experiment makes a comparison between both possible.

The difference in consumption intention for E-numbers and colloquial names

The main goal of this research was to find the difference in consumption intention when using colloquial additive names compared to E-numbers. On average reported scores for the consumption intention for E-numbers were almost similar to the intention for colloquial names. For consumption intention the reported average score for Stevia was also similar to the score for Aspartame. From this it can be concluded that there is no difference in consumption intention when using an E-number compared to a colloquial name or when using Stevia compared to Aspartame.

However an interaction for using E-numbers or colloquial names between Stevia and Aspartame was found for perceived naturalness. Since perceived naturalness has a significant effect on perceived risks it also has an indirect effect on consumption intention, because the perceived risks has a large effect on consumption intention. This means indirectly it does matter for consumption intention whether E-numbers or colloquial names were used. For perceived naturalness there was no significant difference whether the E-number or colloquial name of Aspartame was used, however for Stevia it did matter. In the case of Stevia the perceived naturalness was much higher when a colloquial name was used than when the E-number was used, which would mean that indirectly in the case of Stevia a colloquial name would have a higher consumption intention than the E-number. This could indicate that our research was not able to sense this effect on intention. We feel that if the perceived benefits would have been significant, as predicted by the model, the consumption intention would have been higher when using colloquial names. This is because the perceived naturalness is higher for some colloquial names, a higher perceived naturalness leads to a higher perceived benefits. We suggest repeating this research with the previously mentioned group of respondents that are more focused on health benefits and a more extended benefit message. We believe that both recommendations should influence the significance of the perceived benefits positively and thus make the consumption intention higher when using colloquial names.

Practical implications

For companies it is important to think about whether they will use an E-number or a colloquial name for their additives. Previous research indicates that colloquial names are perceived as more natural than E-numbers (Evans et al., 2010), in combination with the fact that naturalness has a great effect on perceived risks which effects consumption intention in turn, it might be said that companies should use colloquial names. However from the current research it can be concluded that it cannot

blindly be said that the use of colloquial names is better than the use of E-numbers. This research has shown that the use of colloquial names is not better than the use of an E-number when comparing consumption intention. However E-number are seen as less natural than belonging colloquial names, but this is not the case for all additives. For Aspartame, the difference in perceived naturalness between E-numbers and colloquial names can be neglected. Further research should indicate if this is caused by Stevia being marketed as a natural sweetening additive, whilst Aspartame is not. For this reason it could be that the consumers also see additives like Lactic acid (E270), Citric acid (E330) and Fatty acids (E570) as natural, whereas tert-Butylhydroquinone (E319), Orthophosphoric acid (E338) and Beta-cyclodextrin (E459) could possibly be seen as unnatural. To confirm this more research is needed on each of these additives to determine whether the use of a colloquial name is seen as more natural and thus more beneficial.

Although previous research indicates that an E-number is seen as more unnatural this research has found that in the case of the sweeteners Stevia and Aspartame this is not always the case. For companies it is recommended to use the colloquial name Stevia instead of its E-number, because the consumption intention is slightly higher and the colloquial name is seen as more natural, for Aspartame it cannot be said whether an E-number or the colloquial name is better. As previously mentioned health benefit information would probably work better if the target group is a diet group or another group that is interested in health benefits. Therefore companies should probably use health benefit information when they are targeting a consumer group that is interested in these health benefits. To confirm whether this is true the current research should be repeated with a target group that is interested in health benefits, like a diet group and a control group that is not particularly interested in health benefits.

This research aimed at looking towards consumption intention from an angle of perceived risks and benefits instead of the more commonly used theory of planned behavior. Furthermore this research has strengthened the notion that consumers do not recognize E-numbers correctly and that naturalness plays an important role in perceived risks. Finally it can serve as a stepping stone for further research into the use of either colloquial names or E-numbers when using additives.

References

Ajzen, I. (1991). The Theory of Planned Behavior. *Organizational behavior and human decision processes, 50*, 179-211.

Ajzen, I. (2014). Sample TPB Questionnaire.   Retrieved 16-6-2014, 2014

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behaviour*. Englewood Cliffs: Prentice Hall.

Bellisle, F., & Drewnowski, A. (2007). Intense sweeteners, energy intake and the control of body weight. *European Journal of Clinical Nutrition, 61*, 691-700.

Buchler, S., Smith, K., & Lawrence, G. (2010). Food risks, old and new: Demographic characteristics and perceptions of food additives, regulation and contamination in Australia. *Journal of Sociology, 46*(4), 353-373.

Cohen, J. (1992). A power primer. *Psychological bulletin, 112*(1), 155-159.

Devcich, D. A., Pederson, I. K., & Petrie, K. J. (2007). You eat what you are: Modern health worries and the acceptance of natural and synthetic additives in functional foods. *Appetitie, 48*(7), 333-337.

Dixon, J. (2007). Supermarkets as New Food Authorities. In D. Burch & G. Lawrence (Eds.), *Supermarkets and Agri-food Supply Chains: Transformations in the Production and Consumption of Foods*. Cheltenham: Edward Elgar.

European commission. (2007). Summaries of EU legislation. from http://europa.eu/legislation_summaries/other/l21067_en.htm

Evans, G., de Challemaison, B., & Cox, D. N. (2010). Consumers' ratings of the natural and unnatural qualities of foods. *Appetite, 54*, 557-563.

Finucane, M. L., Alhakami, A., Slovic, P., & Johnson, S. M. (2000). The Affect Heuristic in Judgments of Risks and Benefits. *Jounal of behavioral decision making, 13*(1), 1-17.

Fischhoff, B., Slovic, P., & Lichtenstein, S. (1978). How safe is safe enough? A psychometric study of attitude towards technological risks and benefits. *Policy Sciences, 9*(2), 127-152.

Foddy, W. (1994). *Constructing questions for Interviews and Questionnaires: Theory and practice in social research*. Cambridge.

Jukes, D. J. (2013). Food additives in the European Union.   Retrieved 12-3-2014, 2014, from http://www.foodlaw.rdg.ac.uk/additive.htm#1

Knowles, T., & Moody, R. (2007). European food scares and their impact on EU food policy. *British Food Journal, 109*(1), 43-67.

Kushi, L. H., Byers, T., Doyle, C., Bandera, E., McCullough, M., Gansler, T., . . . Thun, M. J. (2006). American Cancer Society Guideline on Nutrition and Physical Activity for Cancer Prevention: Reducing the Risk of Cancer With Healthy Food Choices and Physical Activity.

Marinovich, M., Galli, C. L., Bosetti, C., Gallus, S., & Vecchia La, C. (2013). Aspartame, low-calorie sweeteners and disease: Regulatory safety and epidemiological issues. *Food and Chemical Toxocology, 60*, 109-115.

Mayer, R. C., & Davis, J. H. (1999). The Effect of the Performance Appraisal System on Trust for Management: A Field Quasi-Experiment. *Journal of applied psychology, 84*(1), 123-136.

Mazzocchi, M., Lobb, A., Triall, B. W., & Alessio, C. (2008). Food scares and Trust: A European Study. *Journal of Agricultural Economics, 59*(1), 2-24.

Paans, E. (2013). *Investigating consumers' avoidance of E-numbers.* (MSc), Wageningen University, Wageningen.

Parson, J. T., Siegel, A. W., & Cousins, J. H. (1997). Late adolescent risk-taking: effects of perceived benefits and perceived risks on behavioral intentions and behavioral change. *Journal of Adolescence, 20*(4), 381-392.

Perloff, R. M. (2010). The dynamics of persuasion: communication and attitudes in the 21st century (Vol. 4). New York and Oxon: Routledge.

Rohrmann, B., & Huichang, C. (1999). Risk perception in China and Australia: an exploratory crosscultural study. *journal of risk research, 2*(3), 219-241.

Rozin, P. (1997). The Use of Characteristic Flavoring in Human Culinary Practice. In C. M. APT (Ed.), *Flvor: Its Chemical, Behavioral and Commercial Aspects*. Boulder: Westview Press.

Siegrist, M., Cvetkovich, G., & Roth, C. (2000). Salient Value Similarity, Social Trust, and Risk/Benefit Perception. *Risk Analysis, 20*(3), 353-362.

Siegrist, M., Keller, C., & Kiers, H. A. L. (2006). Lay people's perception of food hazards: Comparing aggregated data and individual data. *Appetite, 47*(3), 324-332.

Siegrist, M., Stampfli, N., Kastenholz, H., & Keller, C. (2008). Perceived risks and perceived benefits of different nanotechnology foods and nanotechnology packaging. *Appetite, 51*(2), 283-290.

Slovic, P. (1987). Perception of Risk. *Science, 236*(4799), 280-285.

Slovic, P. (1999). Trust, emotion, sex, politics, and science: surveying the risk-assessment battlefield. *Risk Analysis, 19*, 689-701.

Sparks, P., & Shepherd, R. (1994). Public perceptions of the potential hazards associated with food production and food consumption: an empirical study. *Risk Analysis, 14*(5), 799-806.

Stallberg-White, C., & Pliner, P. (1999). The effect of flavor principles on willingness to taste novel foods *Appetite, 33*(2), 209-211.

Tandel, K. R. (2011). Sugar substitutes: Health controversy over perceived benefits. *Journal of Pharmacology and Pharmacotherapeutics, 2*(4), 236-243.

Tannahil, A. (1988). Health Promotion and Public Health: A Model in Action. *Community Medicine, 10*(1), 48-51.

Tenbült, P., de Vries, N. K., Dreezens, E., & Martijn, C. (2005). Perceived naturalness and acceptance of genetically modified food. *Appetitie, 45*(1), 47-50.

Trafimow, D., Sheeran, P., Conner, M., & Finlay, K. A. (2002). Evidence that perceived behavioural control is a multidemensional construct: Perceived control and perceived difficulty. *British Journal of Social Psychology, 41*(1), 101-121.

USA TODAY. (2013). Coca-Cola ad to defend artificial sweeteners.   Retrieved 14-3-2014, 2014, from www.usatoday.com/story/business/2013/08/13/coca-cola-aspartame-diet-soft-drinks/2650755/

van Dijk, H., Fischer, A. R. H., & Frewer, L. J. (2011). Consumer Responses to Integrated Risk-Benefit Information Associated with the Consumption of Food. *Risk Analysis, 31*(3), 429-439.

Voedingscentrum. (2015). E-nummers.   Retrieved 16-6, 2015, from http://www.voedingscentrum.nl/encyclopedie/e-nummers.aspx

Zygler, A., Wasik, A., & Namiesnik, J. (2009). Analytical methodologies for determination of artificial sweeteners in foodstuffs. *Tends in Analytical Chemistry, 28*(9), 1082-1102.