Erasmus University Rotterdam
Erasmus School of Economics

Master Thesis

To obtain the academic degree of
Master of Science in Economics & Business
(Major in Marketing)

The influence of differences in health knowledge and health valuation between consumers on the food choice of these consumers

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Date: July 2016

Abstract

This paper examines how differences in health knowledge and health valuation between consumers affect the food choice of these consumers with respect to usual dinner meals at home. The results indicate that consumers with high actual health knowledge and health valuation attach less value to the health attribute and have a lower willingness to pay for a healthier product, compared to consumers with low actual health knowledge and health valuation. And, consumers who say they have a high health knowledge but in fact score low on health knowledge attach more value to the health attribute than consumers who say they have a high health knowledge and indeed score high on health knowledge. In addition, the value attached to the health attribute is the highest value compared to the values attached to the other attributes for all consumers. Finally, consumers who score different on actual health knowledge and health valuation do not automatically vary in their actual eating behavior.

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1. Introduction

Food choice is nowadays an important issue for consumers. Healthy products and products with a healthy image are becoming more attractive to consumers. Consumers are getting more aware of their choice in food, with respect to the amount of sugars for example. They want to make a conscious choice and want to vary more than before in terms of sugar, which results in more demand for products with less or no sugars. Consumers are more critical to the ingredients in their daily food, which is further encouraged by all the media attention. Furthermore, consumers generally understand the connection between food and health, and many have an interest in doing something about it, including the use of nutrition information, but the degree of interest differs between consumers (Grunert & Wills, 2007). The aim of this paper is to address possible reasons for the variation in choices of healthy products between different consumers.

The trend to healthier products has a big impact on sugary brands. Coca-Cola, for example, saw their sales in Dutch supermarkets collapse last year (2015) by almost 9%. Likewise, Friesland Campina sold last year 10 million euro less dairy products, especially less custard. And coincidence or not, more sugar-rich brands[1] face a decline in their sales, up to -16% (ANP, 2016). Coca-Cola's response on this trend is producing products with less sugars, or making smaller packages, which should lead to more conscious choices of consumers. Friesland Campina doubts that the dip in custard sales is due to the health issue, because without sugar it is not possible to create a delicious dessert. Hence, sugary brands need to address the trend to healthier products, otherwise they will not see profits.

In general, there is a big trend to healthy products and products with a healthy image. But, there is a lack of knowledge on the possible drivers and underlying reasons for the choice of a healthy product. Therefore, this paper elaborates on the trend to healthy products. The aim is to link food choice to two aspects of health, health knowledge and health valuation, and investigate how the differences in these two aspects between consumers affect the food choice of these consumers (choice in usual dinner meals, which differ in price, cooking time, taste and health). The research question is therefore as follows:

"How do differences in health knowledge and health valuation between consumers affect the food choice of these consumers with respect to usual dinner meals at home?"

In order to investigate the research question properly, three sub questions will be analyzed. The first one is as follows: *''Are health knowledge and health valuation the main drivers of the choice for a*

[1] Dessert specialist Mona (-10%), Danone (-2%), sandwich-spreads manufacturer De Ruijter (-3%), biscuits producer Lu (-8%), sugar and syrup manufacturer Van Gilse (-11%) and soft drink brands Wicky (-11%), Appelsientje (-7%), Fanta (-4.5%) and Roosvicee (-16%).

healthier product?''. Do consumers who score high on health knowledge and health valuation attach even more value to the health attribute when choosing a dinner meal, compared to consumers who score low on health knowledge and health valuation? And do these consumers with a high health knowledge and health valuation have a substantially higher willingness to pay for healthy meals? Additionally, what is the effect of this possible higher value attached to the health attribute, on the other attributes of the meal (price, cooking time and taste)? Diversity in food choice could also exist between consumers who differ in their stated health knowledge and actual health knowledge. Therefore, the second sub question is: ''*Are there any differences in the food choice between consumers who say they have a high health knowledge but in fact score low on health knowledge and consumers who say they have a high health knowledge and indeed score high on health knowledge?''*. The third sub question investigates whether the consumers' experimental food choices match with their actual eating behavior: *''Do consumers who score different on health knowledge and health valuation automatically vary in their actual eating behavior?''*

1.1 Scientific and Managerial Relevance

Drichoutis et al. (2006) did a review of research on consumer response to nutrition information on food labels and find that most studies suggest that provision and use of health information can significantly change dietary patterns. In general, the use of nutritional labels affects purchasing behavior mainly because consumers want to avoid the negative nutrients in their food products. It turns out that nutritional information influences purchasing behavior, because it affects perceptions and valuations of the product. Several surveys have in that context investigated the impact that claims create on personal evaluations and find that health claims in the front of the package create favorable judgements about a product. For example, when a product features a health content claim, consumers tend to view the product as healthier and are then more likely to buy it, independent of their information search behavior. However, some empirical researchers have shown that provision of health related information does not always lead to healthier consumption (Drichoutis, Lazaridis, & Nayga, 2006). And most importantly, one has to keep in mind that in the food choice process, there will always be a taste-nutrition trade off. The immediate gratification offered by a tasteful product is maybe preferred by consumers above the long run benefits of a nutritious product.

In addition, Downs et al. (2009) find that calorie consumption decreased in fast-food chains in Brooklyn but not in Manhattan, after posting calorie information became legally required. This means that groups which are socio-economically disadvantaged benefit more from the provided health information (Downs, Loewenstein, & Wisdom, 2009). Bollinger et al. (2011) and Wisdom et al. (2010) suggest that calorie information reduces calorie intake significantly (Bollinger, Leslie, & Sorensen,

2011; Wisdom, Downs, & Loewenstein, 2010). Kozup et al. (2003) find that when favorable health claims or nutrition information are presented, consumers have more favorable attitudes toward the product, nutrition attitudes and purchase intentions and they perceive risks of heart disease and stroke to be lower (Kozup, Creyer, & Burton, 2003). However, Elbel et al. (2009) and Finkelstein et al. (2011) detect no effects on healthier food purchasing in junk-food restaurants after the introduction of calorie labeling (Elbel, Kersh, Brescoll, & Dixon, 2009; Finkelstein, Strombotne, Chan, & Krieger, 2011).

There are also several papers that establish that education is closely related to health behaviors. Drewnowski et al. (2004) argue that the education gradient in health behavior is simply due to the higher incomes of higher educated individuals (Drewnowski & Specter, 2004). Leganger et al. (2003) and Saffer (2014) find that higher education is related with higher self-regulation, self-efficacy and internal locus of control (Leganger & Kraft, 2003; Saffer, 2014). Also health knowledge could play a role. Meara (2001) states that higher educated individuals use their existing knowledge in a more efficient way (Meara, 2001). This is partly due to differences in cognitive ability, suggesting that higher intelligence induces the higher educated to be more efficient users of health investment (Bijwaard & Kippersluis, 2015). Kenkel (1991) and Cutler et al. (2010) show that higher educated individuals have superior knowledge on the consequences of certain health behavior (e.g. smoking, drinking etc.), but these differences only account for a limited part of the education inequalities (Kenkel, 1991; Cutler & Lleras-Muney, 2010). However, there is no consensus about the underlying reasons in the education gap. Koç et al. (2015) react on all these papers and find that that the education disparity in diet derives mostly from differences in health knowledge, the superior health knowledge among the higher educated compared to the lower health knowledge of the lower educated. Nonetheless, even after fully equalizing health information across education groups, the better educated tend to choose healthier diets, which mean that higher educated individuals care more about the health consequences of their food (Koç & Kippersluis, 2015).

So, in general, provision of health related information leads to healthier consumption and there are many differences in health behavior between consumers. But, there is little known about the possible drivers and underlying reasons for the choice of a healthy product. Therefore, this paper will contribute to the health food marketing literature by filling the gap on the possible drivers for the choice of healthy products. This is achieved by giving insights in the effect of differences in health knowledge and health valuation between consumers on the food choice of these consumers with respect to usual dinner meals at home, which could lead to useful insights for food- and drink retailers, (non)sugary brands and consumers as well.

The managerial relevance of this paper is large for food- and drink retailers. The trend to healthier products has a big impact on the brands of these retailers. Brands which produce products with a lot

of sugar face a decline in their sales, while brands[2] that take advantage of the health trend, by consistently responding to the reduction of sugars and saturated fats in its products and insisting in its commercials and with its products on a consciously healthy food choice, face a raise in their sales. The answers on the research questions will lead to several important insights for such brands with respect to the ideal composition of their products, their image and their targeting policies. This paper could also have implications for consumers. If health knowledge and health valuation are very important aspects in their food choice, consumers could demand healthier products of manufactures and retailers or do not buy the unhealthy products at all. Moreover, the social relevance of this paper is high, because less healthy products lead to fatness and could result in obesity, cardio vascular diseases, cancer and a high bill at the dentist.

1.2 Structure of the Paper

The remainder of this paper is organized as follows. The next section describes the theory and the corresponding hypotheses. Section 3 presents the methodology of this paper, which is followed by the results in section 4. And finally, the last sections include the discussion, managerial implications, limitations and directions for future research and the conclusion.

[2] Mineral waters of Spa (+8.7%), ice tea of Lipton (+4%), Alpro (+7%) and Zonnatura (+14%).

2. Theory and Hypotheses

In order to answer the research question several hypotheses are formed in this section, in which each hypothesis is linked to the sub questions of the previous section. Further, the conceptual framework which represents the research model of this paper is presented.

2.1 Actual Health Knowledge, Health Valuation

The value attached to the health attribute will be different between the groups of consumers, because in maximizing the utility a consumer gets from a specific food choice, this consumer will face several constraints (Koç & Kippersluis, 2015). The first constraint is that health deteriorates at an aging rate that is partly biological, but also depends endogenously on healthy consumption and unhealthy consumption. Notice here that consumers take into account their own subjective assessment of health deterioration instead of the objective health deterioration (Johansson-Stenman, 2011), lower educated consumers generally have worse health knowledge than the higher educated (Kenkel, 1991; Cutler & Lleras-Muney, 2010), and consumers differ in processing information (Schultz, 1975), in monetary and time costs of obtaining information and in the valuation of health (Ippolito & Mathios, 1990). The other constraints consumers face are a time constraint (second constraint) and a budget constraint (third constraint).

In addition, Wardle et al. (2000) find that nutrition knowledge is significantly associated with healthy eating. They show that nutrition knowledge makes an important contribution, because consumers in the highest quintile for health knowledge are almost 25 times more likely to meet current recommendations for fruit, vegetable and fat intake than those in the lowest quintile (Wardle, Parmenter, & Waller, 2000). Furthermore, Ares et al. (2010) suggest that non-sensory factors such as brand and price could have an important impact on consumer perception of functional foods. In functional food products a component is added or removed to improve the health of these products. They find that the impact of brand, price and health claims is affected by consumer interest in health issues. The influence of non-sensory factors on choice of functional products depends on consumer attitudes towards health related issues. Consumers more interested in keeping themselves healthy are more likely to choose buying functional products. Choices for this group of consumers are less sensitive to brand and price (Ares, Gimenez, & Deliza, 2010). This last finding is in line with Prasad et al. (2008), who find that a household's price response to food purchases is highly correlated with its health consciousness and that the more health conscious a household is, the less price sensitive it is. Their findings suggest that, when targeting healthy food at health-conscious households, marketers may charge a premium (Prasad, Strijnev, & Zhang, 2008). Also, the relative importance attached to nutrition

and weight control is higher for consumers with a healthy lifestyle than for consumers with a less healthy lifestyle (Glanz, Basil, Maibach, Goldberg, & Snyder, 1998).

Moreover, Schifferstein et al. (1998) find that buyers of organic food consider themselves more responsible for their own health and are more likely to undertake preventive health action than the general population (Schifferstein & Oude Ophuis, 1998). Organic food is produced by using production means that features practices that strive to foster cycling of resources, promote ecological balance, and conserve biodiversity. And, In general, organic foods are usually not processed using irradiation, industrial solvents or synthetic food additives. In addition, awareness acts as a crucial factor in changing the attitude of consumers towards organic foods (Jayanthi, 2015). It might be the case that the same holds for healthier products, which means that higher health knowledge and health valuation imply more awareness of healthy products.

Therefore, hypothesis 1A is as follows:

H_{1A}: Consumers with high actual health knowledge and health valuation attach more value to the health attribute and have a higher willingness to pay for healthier products compared to consumers with low actual health knowledge and health valuation.

Consumers who have high valuations of the health attribute, may have different valuations of the other attributes (price, cooking time and taste), compared to consumers who have low valuations of the health attribute. Consumer groups make different choices due to differences in budget and time constraints (Cutler, Glaeser, & Shapiro, 2003; Drewnowski & Specter, 2004), differences in preferences (Drewnowski, 1997) and differences in the efficiency of using market inputs and own time in production (Michael & Becker, 1973).

Furthermore, there exists a widespread notion that healthy meals are expensive, inconvenient, and usually not very tasty (Raghunathan, Naylor, & Hoyer, 2006). In contrast, unhealthy meals are generally cheap, tasty and convenient (Koç & Kippersluis, 2015). Therefore, I expect that a higher value attached to the health attribute will lead to lower values attached to the price-, cooking time- and taste attribute, because the higher health of the product compensates for the downturn of the other attributes. This is in line with Ares et al. (2010), who suggest that choices of groups of consumers who are more interested in keeping themselves healthy, are less sensitive to brand and price. Higher interest in health leads to a higher willingness to compromise liking for healthiness (Ares, Gimenez, & Deliza, 2010). Van Doorn et al. (2011) examine the reasons behind consumers' (un)willingness to pay for organic food and investigate whether there exist differences between virtue and vice food categories. Their results suggest that in vice food categories, organic claims are associated with lower quality, which seems to be only partly compensated by higher prosocial benefits. The lower-quality

perceptions translate into a decreased consumer willingness to pay (Doorn & Verhoef, 2011).

Moreover, consumers of health and natural food find appearance, ease of preparation, and fitness for slimming less important than the other consumers (Schifferstein & Oude Ophuis, 1998). Additionally, consumers who are indifferent to the healthier versions of regular products tend to be more impacted by price and discounts relative to consumers who are primarily health oriented (Trivedi, Sridhar, & Kumar, 2016).

Thus, hypothesis 1B is as follows:

H_{1B}: A higher value attached to the health attribute will lead to lower values attached to the other attributes (price, cooking time and taste).

2.2 Actual Health Knowledge, Stated Health Knowledge

Diversity in food choice could also exist between consumers who differ in their stated health knowledge and actual health knowledge, because of the same reasons as at the first hypotheses and due to a overconfidence bias. Overconfidence refers to a biased way of looking at a situation. When someone is overconfident, he misjudges his values, opinions, beliefs or abilities and he has more confidence than he should have, given the objective parameters of the situation. In this situation, a person thinks that he has a high health knowledge, but in fact scores low on actual health knowledge. More statistically said, someone is overconfident, if his confidence intervals are narrower than his knowledge justifies (Kahneman & Tversky, 1977). So, the difference between stated and actual health knowledge of consumers will probably lead to a different valuation of the health attribute, compared to consumers who score the same on stated and actual health knowledge.

Hence, hypothesis 2 is the following:

H_2: Consumers who say they have a high health knowledge but in fact score low on health knowledge attach more value to the health attribute than consumers who say they have a high health knowledge and indeed score high on health knowledge.

2.3 Actual Eating Behavior

Do consumers who score different on actual health knowledge and health valuation automatically vary in their actual eating behavior? High educated people eat fruits and vegetables more frequently and drink soda less frequently, compared to low educated people, but higher educated people eat also more candies and snacks (Koç & Kippersluis, 2015).

Furthermore, low-fat labels lead all consumers to overeat snack foods, where labeling snacks

as low fat increases food intake during a single consumption occasion by up to 50% (Wansink & Chandon, 2006). This is because low-fat labels decrease the perception of calorie density, it increases perceptions of the appropriate serving size and it decreases consumption guilt. Chandon et al. (2007) also show that consumers are more likely to underestimate the caloric content of main dishes and to choose higher-calorie side dishes, drinks, or desserts when fast-food restaurants claim to be healthy (e.g., Subway) compared to when they do not (e.g., McDonald's), and although nutrition involvement improves the quality of these calorie estimations, it does not reduce the halo effects of the restaurant brand's health positioning. Remarkably, the biasing effects of health claims on calorie estimations are as strong for consumers highly involved in nutrition as for consumers with little interest in nutrition or healthy eating. These findings help explain why the success of fast-food restaurants serving lower-calorie foods has not led to the expected reduction in total calorie intake and in obesity rates (Chandon & Wansink, 2007).

In addition, consuming light variants of products (which are in general a bit healthier than the regular variants) do not lead to actually healthier eating behavior, because consumers are overeating and consuming more of the product if they switch to the light version compared to the situation where they consume the regular version (Cleeren, Geyskens, Verhoef, & Pennings, 2016). This holds not only in the short run, but in the long run as well. Moreover, one has to keep in mind that there is a clear demand for healthful alternatives in the market place, but this is complemented with a desire for regular treats as well (Trivedi, Sridhar, & Kumar, 2016).

Therefore, hypotheses 3 is as follows:

H_3: Consumers who score different on actual health knowledge and health valuation do not automatically vary in their actual eating behavior.

2.4 Conceptual Framework

All the hypotheses together lead to the conceptual framework of figure 2.1, which represents the research model of this paper.

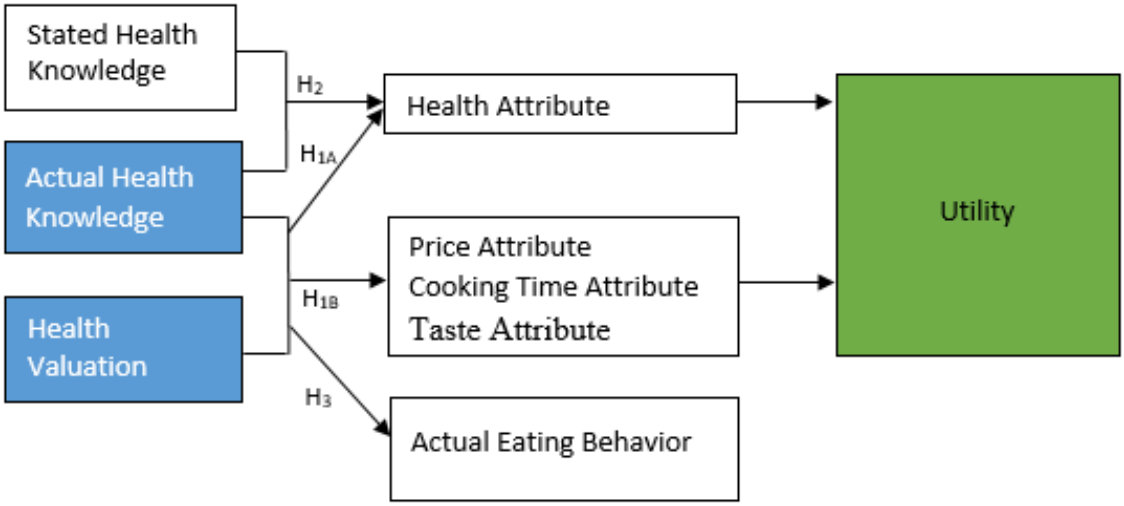

Figure 2.1 Conceptual framework, the arrows show the connection between the different variables, which are based on the hypotheses

3. Methodology

This section describes where the data, which is used to test the hypotheses, come from and how this data will be used. Further, the empirical estimation of this paper is estimated.

3.1 Data

To answer the research questions data of the LISS (Longitudinal Internet Studies for the Social sciences) panel will be used administered by CentERdata (Tilburg University, The Netherlands)[3]. The LISS panel is a representative sample of Dutch individuals who participate in monthly Internet surveys, which consists of 5000 households, comprising 8000 individuals. The panel is based on a true probability sample of households drawn from the population register by Statistics Netherlands. A longitudinal survey is fielded in the panel every year, covering a large variety of domains including work, income, education, housing, time use, consumer behavior, political views, values and personality (Scherpenzeel & Das, 2010). The LISS panel also implemented a survey conducted by H. Koç and H. van Kippersluis, containing questions about food choice, health knowledge and health valuation (Koç & Kippersluis, 2015). This survey was set up as a discrete choice experiment with two phases. The data of the first phase contain the choices of the discrete choice experiment, in which respondents are presented with a number of choice sets, each of which contains two alternatives between which the respondents have to choose. The data of the second phase include the respondents' answers on additional health questions. For this paper both phases are partly used. The next two subsections describe both phases.

3.2 Phase 1. Food Choice

The dependent variable is the utility consumers receive when choosing a specific meal for dinner. Or more specifically, the utility of a meal which one would eat regularly (at least twice a week). Using the choice for a meal which one would eat regularly, avoid the dependence of the choice on the consumer's recent food choices that day or that week (Koç & Kippersluis, 2015). If the choice for a meal which one would eat now was used, the choice would depend more on the eating behavior of the respondents over the past days. The dependent variable utility is used to gain some insights regarding the preferences of the attributes and their associated levels on the choice of a meal. One attempts to determine the relative importance consumers attach to salient attributes and the utilities they attach to the levels of attributes by forcing consumers to make trade-off across attributes (Janssens, Wijnen, Pelsmacker, & Kenhove, 2008). The utility is obtained by making use of the data of the discrete choice experiment (Koç & Kippersluis, 2015), where the respondents have chosen

[3] More information about the LISS panel can be found at: www.lissdata.nl.

between two different meals for dinner. Using this discrete choice experiment, I am able to obtain individual preferences for the characteristics of a certain meal for dinner.

Steptoe et al. (1995) describe the development of a multidimensional measure of motives related to food choice. Nine factors emerged, and were labelled *sensory appeal, health, convenience, price,* mood, natural content, weight control, familiarity and ethical concern, with the first four factors as most important factors (Steptoe, Pollard, & Wardle, 1995). Therefore, the independent variables are price, cooking time, taste and health. These independent variables are also the attributes of the meals. Each attribute consists of three corresponding levels (Koç & Kippersluis, 2015):

- *Price:* 2 euro, 6 euro, 10 euro
- *Cooking time:* 10 minutes, 30 minutes, 50 minutes
- *Taste:* edible, good, delicious
- *Health:* unhealthy, neutral, healthy

The descriptions of these attributes can be found in appendix A.1. The levels of the attribute price are based on a cheap (but still realistic) home-prepared meal, a more luxurious home-prepared meal and a very luxurious home-prepared meal (or a take-away meal). The levels of the attribute cooking time are a summation of the traveling time and preparation time, because these two aspects are relatively unimportant (Kamphuis, Bekker-Grob, & Lenthe, 2015). If the level non-tasty for the attribute taste is used, all other attributes become meaningless (Kamphuis, Bekker-Grob, & Lenthe, 2015). Therefore, the lowest level of this attribute is edible, because this level is at least required by consumers. The levels of the attribute health are ranged from ingredients of the meal that harm healthiness to ingredients of the meal that contributes to a good health. For the sake of clarity, all other characteristics of the meals are assumed to be the same (e.g. equally biological) to avoid assumptions made by respondents about omitted variables. Hence, a possible choice set where the respondents have to choose between meal A and meal B is shown in table 3.1 (Koç & Kippersluis, 2015).

Table 3.1 Example choice set

	Meal A	**Meal B**
Price	2 Euros	6 Euros
Cooking time	10 minutes	30 minutes
Taste	Edible	Delicious
Health	Neutral	Unhealthy

It is not allowed to choose none of them, because such an opt-out option do not convey information about the attribute importance. Furthermore, an unlabeled design is used to avoid potential intrinsic preferences, which could occur if use is made of a labeled design. Each respondent is faced with 18

choice sets, while the levels of the attributes of each choice set are randomly changed. In addition, each respondent is randomly assigned to one of the in total five blocks (18 choice sets per block) to ensure that all the investigated effects are properly identified, which makes 90 choice sets a more comfortable amount than just 18 choice sets if only one block was used. The levels of each attribute are equally divided over the blocks. To generate these 90 choice sets, use is made of the efficient design that chooses the 90 most informative choice sets (Koç & Kippersluis, 2015). Such a design avoid dominant alternatives, uninformative choice sets where one of the meals is superior in all attributes.

3.3 Phase 2. Health Knowledge and Health Valuation

The utility consumers receive when choosing a specific meal for dinner depends also on their health knowledge and their health valuation (next to the attributes of the meal). To investigate the effects of differences in these two aspects between consumers on their utility, I make several groups based on the respondents' actual- and stated health knowledge and health valuation. For the first hypothesis, respondents are placed in the ''high actual health knowledge''-group or in the ''low actual health knowledge''-group, and in the ''high health valuation''-group or in the ''low health valuation''-group as well. For the second hypothesis, the respondents are placed in the ''high actual health knowledge & high stated health knowledge''-group, in the ''high actual health knowledge & low stated health knowledge''-group, in the ''low actual health knowledge & high stated health knowledge''-group or in the ''low actual health knowledge & low stated health knowledge''-group. To form the different groups use is made of the provided health questions about the actual- and stated health knowledge and health valuation (Koç & Kippersluis, 2015). From now on, actual health knowledge is written as AHK, health valuation as HV and stated health knowledge as SHK.

To measure the AHK of the respondents use is made of 12 health statements (Koç & Kippersluis, 2015), see appendix A.2. All the respondents have indicated whether they think these statements are true, false or if they don't know. To allocate the respondents to the group with a high or low level of AHK, I look at the average amount of correct answers. The option ''I don't know'' is also count as incorrect, because this response implies a lack of AHK. If the number of correct answers of a respondent is higher than the average number of correct answers of all the respondents, this respondent is placed in the group with high AHK and otherwise in the group with low AHK.

To measure the HV of the respondents use is made of the following four statements: *''If you do not have your health, you do not have anything'', ''There is nothing more important than good health'', ''There are many things that I care about more than my health'',* and *''Good health is of only minor importance in a happy life''* (Koç & Kippersluis, 2015). All the respondents have indicated to what extent they agree or disagree (totally disagree(1), disagree(2), neutral(3), agree(4), totally agree(5)). A

high extent of agreement to the first and the second statement and a low extent of agreement to the third and the fourth statement, imply a high HV. While, a low extent of agreement to the first and the second statement and a high extent of agreement to the third and the fourth statement, imply a low HV. Therefore, to allocate the respondents to the group with a high or low level of HV, I combine the first plus the second statement together and the third plus the fourth statement together. If, for a respondent, the extent of agreement to the first and the second statement together is higher than the average extent of agreement to the first and the second statement together of all the respondents and the extent of agreement to the third and the fourth statement together is lower than the average extent of agreement to the third and the fourth statement together of all the respondents, then this respondent is placed in the group with high HV and otherwise in the group with low HV.

To measure the stated health knowledge of the respondents use is made of the following question: ''*How would you rate your knowledge about health matters?''* (Koç & Kippersluis, 2015), with the possible answers very low(1), low(2), intermediate(3), good(4) and very good(5). If the stated health knowledge of a respondent is higher than the average stated health knowledge of all the respondents, this respondent is placed in the group with high stated health knowledge and otherwise in the group with low stated health knowledge.

3.4 Actual Eating Behavior and Control Variables

Next to the utility (as dependent variable), the attributes of the meal (as independent variables), health valuation and actual- and stated health knowledge, there are more variables that are analyzed. For the third hypothesis, the actual eating behavior of the respondents is investigated. This is measured by making use of the question how often the respondents eat the following food items (with answer options: never(1), less than once a week(2), 1 to 2 times a week(3), 3 to 4 times a week(4), 5 to 6 times a week(5), every day(6)): *fruits, vegetables, candy, soft drinks and snacks* (Koç & Kippersluis, 2015); and by making use of the question how often they choose the following options for dinner: *home cooking based on individual ingredients, home cooking based on ready-made food (e.g. frozen food, salad, world cuisine, etc.), a take-out or delivery meal and eat in a restaurant* (Koç & Kippersluis, 2015).

Other variables I want to make use of are control variables, like *gender, age, education and income*. The education disparity in diet derives mostly from superior health knowledge among the higher educated (Koç & Kippersluis, 2015). And, the highest rates of obesity occur among population groups with the highest poverty rates and the least education (Drewnowski & Specter, 2004). Furthermore, food preferences and food choices depends on sex and age and are further linked to attitudinal, social, and economic variables such as income (Drewnowski, 1997). Therefore, I test if gender, age, education and net monthly income are moderating effects. Moderation effects mean that

effects are different for different segments of consumers. The above control variables are all measured in categories (see appendix A.3).

3.5 Empirical Estimation

To analyze the data a choice-based conjoint analysis is used, because a choice-based conjoint is the most feasible conjoint to use in case of choice data (Janssens, Wijnen, Pelsmacker, & Kenhove, 2008). I use a multinomial logistic model for the estimation procedure to obtain the values attached and the willingness to pay for each attribute. When choosing between the two meals, the consumer use expected utility to be obtained from the meal as evaluation criteria for the choice decision. Such utility has two parts, the deterministic component as captured by explanatory variables and the random component not captured by the model:

$$U_{i,j} = \beta_i x'_{ij} + \epsilon_{ij}$$

where x is the matrix of the independent variables, β_i is the vector of consumer specific coefficients of the independent variables and ϵ is the error term. The consumer chooses the alternative that yields the largest utility among the available choice alternatives. I can observe the outcome, where the probability of consumer i choosing alternative j can be written as follows:

$$\Pr[Y_i=j] = \pi_j = f_j(x_{ij}) = \frac{\exp(\beta_i x_{ij})}{\sum_{l=1}^{J} \exp(\beta_l x_{il})} = \frac{\exp(\beta_i x_{ij})}{1+\exp(\beta_i x_{ij})} \text{ for J = 1, 2}$$

The utility consumers derive from the meals depends on the price, cooking time, taste and health:

$$U_{i,j} = \beta_0 + \beta_1 price + \beta_2 cooking\ time + \beta_3 taste + \beta_4 health + \epsilon_{ij}$$

Using such a multinomial logistic model makes it possible to gain insights regarding the preferences of the attributes and consumers' associated levels on the choice of a meal. Using utility as dependent variable, I can determine the relative importance consumers attach to salient attributes and the utilities they attach to the levels of attributes by forcing them to make trade-off across attributes.

Furthermore, the willingness to pay (WTP) for a one unit increase in each attribute can be obtained, because price is included as one of the independent variables. The utility changes when an upgrade is given, i.e. the value of an attribute increases. One can compensate the change in utility by changing the price of the product. For example, when the taste increases from edible to good (keeping everything else except price same), the utility increases as follows: $\Delta Utility = \beta_1 \Delta Price + \beta_3$, where $\Delta Utility$ is the change in utility and $\Delta Price$ is the change in price. If the change in utility has to be zero, than the price has to increase by $-\beta_3/\beta_1$ (which is the WTP for the one unit increase of taste).

Before the above empirical analysis is possible, it is necessary to structure the data. For every choice set of each observation the attributes of meal A and meal B are formulated; i.e. Meal1Price = price of meal A, Meal2Price = price of meal B, Meal1CookingTime = cooking time of meal A, Meal2CookingTime

= cooking time of meal B, Meal1Taste = taste of meal A, Meal2Taste = taste of meal B, Meal1Health = health of meal A and Meal2Health = health of meal B. The choice between these two meals equals 1 if the respondent chooses meal A and equals 2 if the respondent chooses meal B. The price and the cooking time are measured on a continuous scale, the taste and the health on an ordinal scale and the choice between the two meals on a nominal scale. Then, for the choice model, I have to subtract the attribute levels of one meal from the other (with meal A as the chosen baseline here). So, in order to execute the multinomial logistic regression the data is computed by subtracting the variables of meal A from the variables of meal B; i.e. Price = Meal2Price - Meal1Price, Cooking Time = Meal2CookingTime - Meal1Cookingtime, Taste = Meal2Taste - Meal1Taste and Health = Meal2Health - Meal1Health.

To test if gender, age, education and income are moderating effects, these control variables are included as interaction effects. Moderation effects mean that effects are different for different segments of consumers. For example, it could be the case that price, cooking time, taste and health play a different role for men compared to women.

For the first two parts of the sub questions (H_1 and H_2), I create dummy variables for every single group, which take the value 1 if the respondent belongs to the specific group and 0 otherwise. These dummy variables are multiplied with the independent variables (price, cooking time, taste and health) and are included as interaction effects. This is done to obtain the values attached and WTP's of each attribute for every ''actual health knowledge''-group, ''health valuation''-group and ''actual health knowledge & stated health knowledge''-group. I investigate the differences in these values attached to each attribute and WTP's between the different groups of consumers. The dummy approach is used to see if the possible differences in the values attached between the groups are significant or not.

For the third part of the sub questions (H_3), I compare the different ''actual health knowledge''-groups and the ''health valuation''-groups on the means of the ''actual eating behavior''-variables to check whether the consumers' experimental food choices match with their actual eating behavior. In addition, I investigate if these means, how often the respondents consume the food items mentioned and how often they choose for the dinner options named, are significantly different between the ''high actual health knowledge''-group and the ''low actual health knowledge''-group and between the ''high health valuation''-group and the ''low health valuation''-group. This is done by performing multiple two sided independent samples t-tests.

4. Data Analysis and Results

This section presents the descriptive statistics of the data and discusses the results of this paper.

4.1 Descriptive Statistics

The sample consists of 1206 respondents and hence 21708 observations, because every respondent is faced with 18 choice sets. After dropping observations with missing values for variables in the analysis, I end up with 21655 observations for the situation without control variables and with 18613 observations for the situation with control variables. The frequency table of the control variables can be found in appendix B.1, and shows that all respondents are more or less equally divided among the categories of gender, age, education and income. The descriptive statistics are shown in table 4.1.

Table 4.1 Descriptive statistics control variables

	N	*Min*	*Max*	*Mean*	*St. dev*
Gender	1206	1	2	1.50	.50
Age	1206	1	7	3.89	2.09
Education	1126	1	6	3.25	1.68
Income	1198	0	14	3.30	3.55
Valid N	1119				

Note: all the control variables are measured in categories (see section 3.3).

The mean of the gender variable is 1.50, which means that the total number of males and females is equally divided. The mean of the variable age is 3.89 and hence between the category 25 - 34 years and the category 35 - 44 years, but more located in the last category (35 - 44 years). The mean of the variable education is 3.25, so between the category Havo VWO and the category MBO, but more directed to the first category (Havo VWO). Finally, the mean of the income variable is 3.30 and thus between the category EUR 1001 to EUR 1500 and the category EUR 1501 to EUR 2000, but more headed to the first category (EUR 1001 to EUR 1500).

Appendix B.2 shows the descriptive statistics of the ''actual eating behavior''-variables. The numbers of the variables actual- and stated health knowledge and health valuation are shown in appendix B.3. The average amount of correct answers on the 12 health statements, which are used to measure actual health knowledge, is 7.81. This average leads to the distribution of 736 respondents in the ''high actual health knowledge''-group and 470 respondents in the ''low actual health knowledge''-group of the in total 1206 respondents. With regard to health valuation, the average of the first and the second statement together (*''If you do not have your health, you do not have anything''* and *''There is nothing more important than good health''*) is 7.63 and the average of the third and the fourth statement together (*''There are many things that I care about more than my health''* and *''Good health is of only*

minor importance in a happy life'') is 4.75. Based on these averages, 428 respondents are placed in the ''high health valuation''-group and 778 respondents are placed in the ''low health valuation''-group of the in total 1206 respondents. The average of the stated health knowledge, measured by the question ''*How would you rate your knowledge about health matters?*'', is 3.46. This average leads to the distribution of 542 respondents in the ''high stated health knowledge''-group and 664 respondents in the ''low stated health knowledge''-group of the in total 1206 respondents. Table 4.2 shows the number of respondents and observations per group, based on the above averages.

Table 4.2 Number of respondents (Resp.) and observations (Obs.) per ''actual health knowledge''-group, ''health valuation''-group and ''actual health knowledge & stated health knowledge''-group

Group	Resp.	Obs.	Group	Resp.	Obs.
High Actual Health Knowledge	736	13248	*High Actual Health Knowledge, High Stated Health Knowledge*	374	6732
Low Actual Health Knowledge	470	8460	*High Actual Health Knowledge, Low Stated Health Knowledge*	362	6516
High Health Valuation	428	7704	*Low Actual Health Knowledge, High Stated Health Knowledge*	168	3024
Low Health Valuation	778	14004	*Low Actual Health Knowledge, Low Stated Health Knowledge*	302	5436

4.2 Results

This subsection presents the results of this paper and describes whether each hypothesis is supported or rejected. Firstly, the basic model is analyzed. Subsequently, in subsections 4.2.1 and 4.2.2, the first two hypotheses are tested by adding the group dummy variables to the basic model. The explanation of the variables in these two subsections, in terms of parameter estimations, WTP's, significance levels and standard errors, remains the same as in the basic model. In subsection 4.2.3 the third hypothesis is tested. Table 4.3 shows the output of the multinomial logistic regression on the basic model:

$$U_{i,j} = \beta_0 + \beta_1 price + \beta_2 cooking\ time + \beta_3 taste + \beta_4 health + \epsilon_{ij}$$

Table 4.3 Multinomial logistic regression output basic model

	Parameter Estimates		**WTP for 1 unit increase**
	β	*Exp(β)*	
Constant	-.008 *(.014)*	-	-
Price	-.098* *(.004)*	.91	-
Cooking time	-.011* *(.001)*	.99	-.011/.098 = - €0.11
Taste	.22* *(.011)*	1.24	.22/.098 = €2.24
Health	.93* *(.021)*	2.54	.93/.098 = €9.49

*Note: standard errors are in parentheses, the symbol * indicates that the coefficients are statistically significant at the 5 percent level.*

The above model links the explanatory variables with the choice probability for each choice alternative. All the attributes have a statistically significant effect on the food choice. Furthermore, the values of the parameters have the expected sign. An increase in price and cooking time of a specific alternative has a negative effect on the probability that this alternative is chosen, while an increase in taste and health has a positive effect on the probability that this alternative is chosen.

However, a direct interpretation is not straightforward, as the effect is channeled through a nonlinear function. The interpretation of the parameters is therefore, next to log odds, examined in terms of odds. The log odds are as follows: $U_{i,j} = \beta_0 + \beta_1 \text{price} + \beta_2 \text{cooking time} + \beta_3 \text{taste} + \beta_4 \text{health} = \text{Log} \frac{\text{Probability (Event)}}{\text{Probability (No event)}}$. The parameters (β's) show the change in the log odds for a change in the independent variables by one unit. The log odds for the food choice of a specific alternative will decrease by 0.098 points if the price increases with one unit (euro), will decrease by 0.011 points if the cooking time increases with one unit (minute), will increase by 0.22 points if the taste increases with one unit (from edible to good, or from good to delicious) and will increase by 0.93 points if the health increases with one unit (from unhealthy to neutral, or from neutral to healthy); all other things being equal. The odds are defined as follows: $e^{\beta 0 + \beta 1 \text{price} + \beta 2 \text{cooking time} + \beta 3 \text{taste} + \beta 4 \text{health}} = e^{\beta_0} e^{\beta_1 \text{price}} e^{\beta_2 \text{cookingtime}} e^{\beta_3 \text{taste}} e^{\beta_4 \text{health}} = \frac{\text{Probability (Event)}}{\text{Probability (No event)}}$. The odds ratios (Exp(β)) give the change in the odds if the independent variables increase with one unit. The odds for the food choice of a certain alternative will decrease by a factor of 0.91 if the price increases with one unit, will decrease by a factor of 0.99 if the cooking time increases with one unit, will increase by a factor of 1.24 if the taste increases with one unit and will increase by a factor of 2.54 if the health increases with one unit; all other things being equal.

Furthermore, the willingness to pay for a one unit increase in each attribute is calculated. The positive values mean that the consumer is willing to pay that amount for a unit upgrade of these attributes. The negative value implies that the consumer is willing to pay that amount for a unit decrease of that attribute. The average consumer is respectively willing to pay - €0.11, €2.24 and €9.49 for a one unit increase in cooking time (minute), taste (from edible to good, or from good to delicious) and health (from unhealthy to neutral, or from neutral to healthy).

In addition, the categories of each control variable are added as interaction effects in the basic model for each control variable separately. The output of these multinomial logistic regressions could be found in appendix C.1 (gender), C.2 (age), C.3 (education) and C.4 (income). All the single attributes have again a statistically significant effect on the food choice for all these performed regressions, with almost the same parameter estimates of each attribute as in the basic model of above. The interaction effects for the categories of the gender- and income variable are not significant, which imply that both

males and females and all the different income categories attach the same values to each attribute. For the age- and education variable there are only a few significant differences between some categories. The interaction effects of taste with the groups 25-34 years and 45-54 years and of health with the groups primary school, Havo VWO and HBO, are statistically significant. Hence, the groups 25-34 years and 45-54 years attach a lower value to the taste attribute, with a WTP for the taste attribute of respectively €1.61 and €1.08 compared to €2.83 of the rest of the respondents. And the groups primary school, Havo VWO and HBO attach a lower value to the health attribute, with a WTP for the health attribute of respectively €8.72, €8.36 and €7.62 compared to €10.84 of the rest of the respondents.

In the next two subsections, 4.2.1 and 4.2.2, all the single attributes (price, cooking time, taste and health) keep having a significant effect on the food choice with almost the same values as in the basic model. Therefore, the focus of these two subsections will lie on the interpretation and significance of the group dummy variables, added to the basic model as interaction effects with the attributes.

4.2.1 Actual Health Knowledge, Health Valuation

To investigate the differences in the values attached to each attribute and the WTP's of each attribute between the different groups of consumers, the group dummy variables are multiplied with the independent variables (price, cooking time, taste and health) and are included as interaction effects in the basic model. The differences between the ''high AHK''-group and the ''low AHK''-group are obtained by using the following formula:

$$U_{i,j} = \beta_0 + \beta_1 price + \beta_2 cooking\ time + \beta_3 taste + \beta_4 health + \beta_5 price*(high\ AHK) + \beta_6 cooking\ time*(high\ AHK) + \beta_7 taste*(high\ AHK) + \beta_8 health*(high\ AHK) + \epsilon_{ij}$$

where the ''low AHK''-group serves as base group.

This formula leads to the output given in table 4.4.

Table 4.4 Multinomial logistic regression output ''actual health knowledge''

	Parameter Estimates		**WTP for 1 unit increase**
	β	*Exp(β)*	
Constant	-.007 *(.014)*	-	-
Price	-.10* *(.007)*	.90	-
Cooking time	-.011* *(.001)*	.99	-.011/.10 = - €0.11
Taste	.25* *(.019)*	1.28	.25/.10 = €2.44
Health	1.03* *(.036)*	2.81	1.03/.10 = €10.12
Price(high AHK)*	.007 *(.009)*	1.01	-
Cooking time(high AHK)*	.00 *(.001)*	1.00	-.011/.10 = - €0.11
Taste(high AHK)*	-.047* *(.024)*	.95	(.25 - .047)/.10 = €1.98
Health(high AHK)*	-.16* *(.045)*	.85	(1.03 - .16)/.10 = €8.56

The interaction effects of price and cooking time with the ''high-AHK''-group are not significant, which indicate that the price and the cooking time are equally valued by the ''high AHK''-group and the ''low AHK''-group. Hence, the log odds for the food choice of a specific alternative will decrease by 0.10 points if the price increases with one unit and will decrease by 0.011 points if the cooking time increases with one unit. And the odds will decrease by a factor of 0.90 if the price increases with one unit and will decrease by a factor of 0.99 if the cooking time increases with one unit. The willingness to pay for both groups is - €0.11 for a one unit increase in cooking time.

The interaction effects of taste and health with the ''high-AHK''-group are significant, which mean that the ''high AHK''-group attaches less value to the taste- and health attribute compared to the ''low AHK''-group. Hence, the log odds will increase by respectively 0.20 and 0.25 points if the taste increases with one unit and will increase by respectively 0.87 and 1.03 points if the health increases with one unit. And the odds will increase by a factor of respectively 1.22 and 1.28 if the taste increases with one unit and will increase by a factor of respectively 2.39 and 2.81 if the health increases with one unit. The willingness to pay for the ''high AHK''-group and the ''low AHK''-group is respectively €1.98 and €2.44 for a one unit increase in taste and respectively €8.56 and €10.12 for a one unit increase in health.

Hence, consumers with low actual health knowledge attach the same value to price and cooking time and attach more value to taste and health compared to consumers with high actual health knowledge, as shown in figure 4.1.

Figure 4.1 Parameter estimates ''actual health knowledge''-groups

The differences between the ''high HV''-group and the ''low HV''-group are obtained by using the following formula:

$$U_{i,j} = \beta_0 + \beta_1 price + \beta_2 cooking\ time + \beta_3 taste + \beta_4 health + \beta_5 price*(high\ HV) + \beta_6 cooking\ time*(high\ HV) + \beta_7 taste*(high\ HV) + \beta_8 health*(high\ HV) + \epsilon_{ij}$$

where the ''low HV''-group serves as base group.

Table 4.5 shows the results of this executed regression.

Table 4.5 Multinomial logistic regression output ''health valuation''

	Parameter Estimates		**WTP for 1 unit increase**
	β	*Exp(β)*	
Constant	-.007 *(.014)*	-	-
Price	-.098* *(.005)*	.91	-
Cooking time	-.012* *(.001)*	.99	-.012/.098 = - €0.12
Taste	.22* *(.014)*	1.24	.22/.098 = €2.22
Health	.97* *(.027)*	2.63	.97/.098 = €9.87
Price(high HV)*	.00 *(.009)*	1.00	-
Cooking time(high HV)*	.002 *(.001)*	1.00	-.012/.098 = - €0.12
Taste(high HV)*	-.001 *(.024)*	1.00	.22/.098 = €2.22
Health(high HV)*	-.098* *(.044)*	.91	(.97 - .098)/.098 = €8.87

The interaction effects of price, cooking time and taste with the ''high-HV''-group are not significant, which suggest that the price, cooking time and taste are equally valued by the ''high HV''-group and the ''low HV''-group. Hence, the log odds for the food choice of a specific alternative will decrease by 0.098 points if the price increases with one unit, will decrease by 0.012 points if the cooking time increases with one unit and will increase by 0.22 points if the taste increases with one unit. And the odds will decrease by a factor of 0.91 if the price increases with one unit, will decrease by a factor of 0.99 if the cooking time increases with one unit and will increase by a factor of 1.24 if the taste increases with one unit. The willingness to pay for both groups is - €0.12 for a one unit increase in cooking time and €2.22 for a one unit increase in taste.

The interaction effect of health with the ''high-HV''-group is significant, which indicates that the ''high HV''-group attaches less value to health attribute compared to the ''low HV''-group. Hence, the log odds will increase by respectively 0.87 and 0.97 points if the health increases with one unit. And the odds will increase by a factor of respectively 2.39 and 2.63 if the health increases with one unit. The willingness to pay for the ''high HV''-group and the ''low HV''-group is respectively €8.87 and €9.87 for a one unit increase in health.

Hence, consumers with low health valuation attach the same value to the price-, cooking time- and taste attribute and attach more value to the health attribute compared to consumers with high health valuation, as shown in figure 4.2

Figure 4.2 Parameter estimates ''health valuation''-groups

Therefore, H_{1A} is rejected. This hypothesis was formulated as follows: *''Consumers with high actual health knowledge and health valuation attach more value to the health attribute and have a higher willingness to pay for healthier products compared to consumers with low actual health knowledge and health valuation''*. Diversity exists between the different groups of consumers in the value attached to the health attribute, but not in the expected direction. Consumers with high actual health knowledge and health valuation attach namely less value to the health attribute and have a lower willingness to pay for a healthier product, compared to consumers with low actual health knowledge and health valuation. In addition, I do not have sufficient statistical evidence to reject H_{1B}. This hypothesis was stated as follows: *''A higher value attached to the health attribute will lead to lower values attached to the other attributes (price, cooking time and taste)''*. It is not the case that the groups which attach a higher value to the health attribute attach lower values to the other attributes. The ''low AHK''-group (attaching a higher value to health compared to the ''high AHK''-group) attaches the same value to price and cooking time and a higher value to taste, and the ''low HV''-group (attaching a higher value to health compared to the ''high HV''-group) attaches the same value to price, cooking time and taste. But, in general, the value attached to the health attribute is the highest value compared to the values attached to the other attributes.

4.2.2 Actual Health Knowledge, Stated Health Knowledge

To obtain the differences between the ''AHK & SHK''-groups the following formula is used:

$$U_{i,j} = \beta_0 + \beta_1 price + \beta_2 cooking\ time + \beta_3 taste + \beta_4 health + \beta_5 price*(high\ AHK\ \&\ high\ SHK) + \beta_6 cooking\ time*(high\ AHK\ \&\ high\ SHK) + \beta_7 taste*(high\ AHK\ \&\ high\ SHK) + \beta_8 health*(high\ AHK\ \&\ high\ SHK) + \beta_9 price*(high\ AHK\ \&\ low\ SHK) + \beta_{10} cooking\ time*(high\ AHK\ \&\ low\ SHK) + \beta_{11} taste*(high\ AHK\ \&\ low\ SHK) + \beta_{12} health*(high\ AHK\ \&\ low\ SHK) + \beta_{13} price*(low\ AHK\ \&\ high\ SHK) + \beta_{14} cooking\ time*(low\ AHK\ \&\ high\ SHK) + \beta_{15} taste*(low\ AHK\ \&\ high\ SHK) + \beta_{16} health*(low\ AHK\ \&\ high\ SHK) + \epsilon_{ij}$$

where the ''low AHK & low SHK''-group serves as the base group.

Table 4.6 shows the output of this regression.

Table 4.6 Multinomial logistic regression output ''actual health knowledge & stated health knowledge''

	Parameter Estimates		**WTP for 1 unit increase**
	β	*Exp(β)*	
Constant	-.007 *(.014)*	-	-
Price	-.10* *(.008)*	.90	-
Cooking time	-.013**(.001)*	.99	-.013/.10 = - €0.13
Taste	.22* *(.024)*	1.25	.22/.10 = €2.19
Health	1.04* *(.044)*	2.83	1.04/.10 = €10.40
Price(high AHK & high SHK)*	-.001 *(.011)*	1.00	-
Cooking time(high AHK & high SHK)*	.001 *(.002)*	1.00	-.013/.10 = - €0.13
Taste(high AHK & high SHK)*	-.016 *(.031)*	.98	.22/.10 = €2.19
Health(high AHK & high SHK)*	-.13* *(.059)*	.88	(1.04 - .13)/.10 = €9.09
Price(high AHK & low SHK)*	.011 *(.011)*	1.01	-
Cooking time(high AHK & low SHK)*	.003 *(.002)*	1.00	-.013/.10 = - €0.13
Taste(high AHK & low SHK)*	-.019 (.031)	.98	.22/.10 = €2.19
Health(high AHK & low SHK)*	-.20* *(.058)*	.82	(1.04 - .20)/.10 = €8.37
Price(low AHK & high SHK)*	-.007 *(.014)*	.99	-
Cooking time(low AHK & high SHK)*	.004* *(.002)*	1.00	(-.013 + .004)/.10 = - €0.09
Taste(low AHK & high SHK)*	.085* *(.040)*	1.09	(.22 + .085)/.10 = €3.04
Health(low AHK & high SHK)*	-.020 *(.075)*	.98	1.04/.10 = €10.40

The interaction effect of price with the different groups is not significant, which suggests that the price is equally valued by the ''low AHK & low SHK''-group, the ''high AHK & high SHK''-group, the ''high AHK & low SHK''-group and the ''low AHK & high SHK''-group. Hence, the log odds for the food choice of a specific alternative will decrease by 0.10 points if the price increases with one unit. And where the odds will decrease by a factor of 0.90 if the price increases with one unit.

The interaction effects of health with the ''high AHK & high SHK''-group and with the ''high AHK & low SHK''-group and of cooking time and taste with the ''low AHK & high SHK''-group are significant, which indicate that the ''high AHK & high SHK''-group and the ''high AHK & low SHK''-group attach less value to the health attribute and the ''low AHK & high SHK''-group attaches more value to the cooking time and taste. The log odds will decrease by respectively 0.013, 0.013, 0.013 and 0.017 points if the cooking time increases with one unit, will increase by respectively 0.22, 0.22, 0.22 and

0.31 points if the taste increases with one unit and will increase by respectively 1.04, 0.91, 0.84 and 1.04 points if the health increases with one unit. And the odds will decrease by a factor of respectively 0.99, 0.99, 0.99 and 1.02 if the cooking time increases with one unit, will increase by a factor of respectively 1.25, 1.25, 1.25 and 1.36 if the taste increases with one unit and will increase by a factor of respectively 2.83, 2.48, 2.32 and 2.83 if the health increases with one unit. The ''low AHK & low SHK''-group, the ''high AHK & high SHK''-group, the ''high AHK & low SHK''-group and the ''low AHK & high SHK''-group are respectively willing to pay - €0.13, - €0.13, - €0.13 and - €0.09 for a one unit increase in cooking time, respectively €2.19, €2.19, €2.19 and €3.04 for a one unit increase in taste and respectively €10.40, €9.09, €8.37 and €10.40 for a one unit increase in health.

Hence, consumers with high actual health knowledge plus high stated health knowledge and consumers with high actual health knowledge plus low stated health knowledge attach less value to health and consumers with low actual health knowledge plus high stated health knowledge attach more value to cooking time and taste, as shown in figure 4.3.

Figure 4.3 Parameter estimates ''actual health knowledge & stated health knowledge''-groups

Therefore, I do not have sufficient statistical evidence to reject H_2. This hypothesis was formulated as follows: *''Consumers who say they have a high health knowledge but in fact score low on health knowledge attach more value to the health attribute than consumers who say they have a high health knowledge and indeed score high on health knowledge''*. Diversity exists between the different groups of consumers in the value attached to the health attribute, and also in the expected direction. Consumers who say they have a high health knowledge but in fact score low on health knowledge (''low AHK & high SHK''-group) attach more value to the health attribute [β: 1.04, Exp(β): 2.83, WTP: €10.40] than consumers who say they have a high health knowledge and indeed score high on health knowledge (''high AHK & high SHK''-group) [β: 0.91, Exp(β): 2.48, WTP: €9.09].

4.2.3 Actual Eating Behavior

To check whether the consumers' experimental food choices match with their actual behavior, I compare the ''actual health knowledge''- and the ''health valuation''-groups on the means of the ''actual eating behavior''-variables. The means of each food item and dinner option per group are given in table 4.7, where the values in bold are the highest means of each variable per ''AHK''-group and ''HV''-group and where the values in italic are the lowest means.

Table 4.7 Means ''actual eating behavior''-variables per group

	Total	**High AHK**	**Low AHK**	**High HV**	**Low HV**
Fruits	4.84	*4.81*	**4.89**	*4.81*	**4.86**
Vegetables	5.26	*5.25*	**5.27**	*5.24*	**5.27**
Candy	3.03	*3.02*	**3.06**	**3.04**	*3.03*
Soft drinks	2.74	**2.76**	*2.72*	**2.80**	*2.71*
Snacks	2.56	*2.55*	**2.57**	**2.56**	*2.55*
Home cooking based on individual ingredients	4.85	*4.82*	**4.90**	**4.87**	*4.84*
Home cooking based on ready-made food	2.01	*2.00*	**2.03**	*1.98*	**2.03**
A take-out or delivery meal	1.74	**1.75**	*1.71*	**1.80**	*1.70*
Eat in a restaurant	1.86	**1.88**	*1.83*	**1.89**	*1.84*

Note: never(1), less than once a week(2), 1 to 2 times a week(3), 3 to 4 times a week(4), 5 to 6 times a week(5), every day(6)

This table implies that the ''high AHK''-group consumes more often soft drinks, but less often fruits, vegetables, candy and snacks, and more often chooses for a take-out or delivery meal and eat in a restaurant, but less often for home cooking based on individual ingredients and home cooking based on ready-made food, compared to the ''low AHK''-group. This table also suggests that the ''high HV''-group consumes more often candy, soft drinks and snacks, but less often fruits and vegetables, and more often chooses for home cooking based on individual ingredients, a take-out or delivery meal and eat in a restaurant, but less often for home cooking based on ready-made food, compared to the ''low HV''-group. Tables 4.4 and 4.5 visualize these means in graphs.

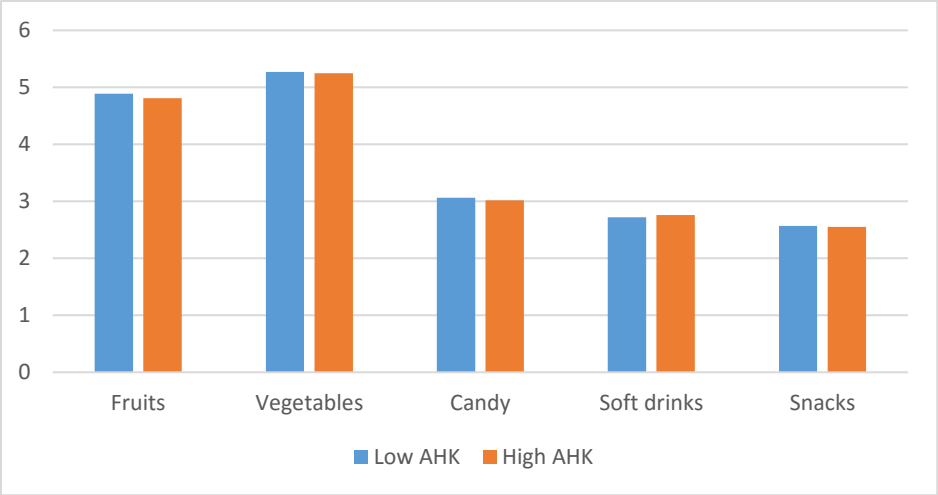

Figure 4.4 Actual eating behavior ''actual health knowledge''-groups

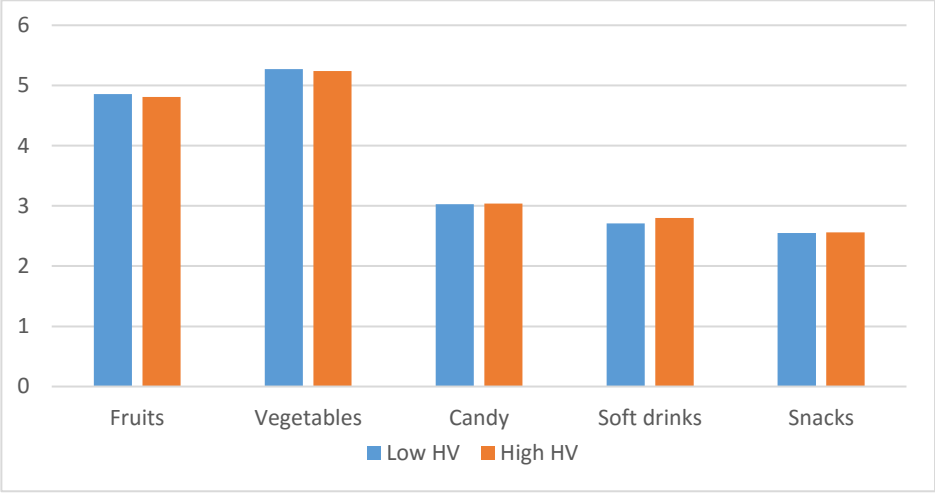

Figure 4.5 Actual eating behavior ''health valuation''-groups

Hence, the ''low AHK''-group (which attaches more value to health) is not always consuming healthier products compared to the ''high AHK''-group; the ''low AHK''-group consumes more often fruits and vegetables and less often soft drinks, but also more often candy and snacks. This implies that for the ''AHK''-groups the consumers' experimental food choices do not match with their actual eating behavior. However, the ''low HV''-group (which attaches more value to health) is consuming healthier products compared to the ''high HV''-group; the ''low HV''-group consumes more often fruits and vegetables, and also less often candy, soft drinks and snacks. This suggests that for the ''HV''-groups the consumers' experimental food choices do match with their actual eating behavior.

In addition, I investigate if the means, of how often the respondents consume the food items mentioned and how often they choose for the dinner options named, are significantly different between the groups. I perform multiple two sided independent samples t-tests to test if these means are actually different between the ''high AHK''-group and the ''low AHK''-group and between the ''high

HV''-group and the ''low HV''-group. The H_0 of these t-tests is that the means are not significantly different between the groups, and the H_1 states that the means are significantly different between the groups. Table 4.8 shows the t-values and the p-values of these t-tests per variable for both groups.

Table 4.8 Independent samples t-tests ''actual eating behavior''-variables for ''actual health knowledge''-groups and ''health valuation''-groups

	Actual Health Knowledge		**Health Valuation**	
	t-value	*p-value*	*t-value*	*p-value*
Fruits	-.95	.34	-.55	.58
Vegetables	-.35	.73	-.52	.60
Candy	-.42	.67	.056	.96
Soft drinks	.37	.71	.90	.37
Snacks	-.37	.71	.17	.87
Home cooking based on individual ingredients	-1.25	.21	.54	.59
Home cooking based on ready-made food	-.49	.62	-1.01	.31
A take-out or delivery meal	1.05	.29	2.41	.016*
Eat in a restaurant	1.33	.18	1.39	.17

*Note: the symbol * indicates that the p-values are statistically significant at the 5 percent level, the critical t-value is 1.65.*

The p-values are not significant on a 5% level ($p > 0.05$), which indicate that all the means are not significantly different between the groups. Except for the mean of ''a take-out or delivery meal'' between the ''high HV''-group and the ''low HV''-group, which has a p-value of 0.016 ($p < 0.05$). This indicates that respondents with a high health valuation choose more often for a take-out or delivery meal compared to respondents with a low health valuation. Hence, the t-tests suggest that the consumers' experimental food choices do not match with their actual behavior, because the different groups do not vary in their actual eating behavior (except for one minor variable).

Therefore, I do not have sufficient statistical evidence to reject H_3. This hypothesis was stated as follows: *''Consumers who score different on health knowledge and health valuation do not automatically vary in their actual eating behavior''*. The means of the ''actual eating behavior''-variables are not significantly different (expect for one minor variable) between the ''high AHK''-group and the ''low AHK''-group and between the ''high HV''-group and the ''low HV''-group, which suggest that consumers who score different on health knowledge and health valuation do not automatically vary in their actual eating behavior.

5. Discussion

In this section answers are given to the research questions formulated in the first section. The questions will be answered based on the results.

The first question was formulated as follows: ''*Are health knowledge and health valuation the main drivers of the choice for a healthier product?*''. This question was divided into several other sub questions: Do consumers who score high on health knowledge and health valuation attach even more value to the health attribute and do these consumers have a substantially higher willingness to pay for healthy meals, compared to consumers who score low on health knowledge and health valuation? Additionally, what is the effect of this possible higher value attached to the health attribute, on the other attributes of the meal (price, cooking time and taste)?

The first finding of this paper indicates that diversity exists between the different groups of consumers in the value attached to the health attribute, but not in the expected direction. It is namely apparent that consumers who score high on actual health knowledge and health valuation attach less value to the health attribute and have a lower willingness to pay for a healthier product, compared to consumers who score low on actual health knowledge and health valuation. Furthermore, it is not the case that the groups which attach a higher value to the health attribute attach lower values to the other attributes. But, in general, the value attached to the health attribute is the highest value attached compared to the values attached to the other attributes.

The finding that consumers with high actual health knowledge and health valuation attach less value to the health attribute compared to consumers with low actual health knowledge and health valuation is not in line with the first hypothesis and contradicting to the literature described in section 2. A possible explanation for this contradicting finding could be that when objective calorie levels were higher (lower) than expected, purchase intentions were lower (higher) (Burton, Howlett, & Tangari, 2009). Burton et al. (2009) find that exposure to objective calorie and nutrient information has a negative (somewhat positive) impact on consumers' perceptions and evaluations of higher (lower) calorie and fat meals. They show that the percentage of consumers choosing the more healthful menu items decreased when actual calories were disclosed and exceeded expected levels, and the percentage of consumers choosing the more healthful items increased when actual calories were disclosed and levels were less than expected.

In addition, it might be that some marketing slogans put us in the wrong direction. These marketing slogans, mostly outstanding printed at the front of the product, could generate a false suggestion. The essential information is listed at the back of the product, often hidden away in tiny letters, but almost nobody dig deeper in these incomprehensible label-language. That makes every

marketing slogan that puts the consumer in the wrong direction misleading, even if it is corrected immediately on the same package. In the Netherlands, it is namely allowed to generate a false suggestion at the front of the product and withdraw it at the back of the product. Therefore, the downside of the increasing interest in healthier products is that the pressure of fraud will increase. The higher the interest in healthy products, the more producers of unhealthy products shout that they are also pure, honest and natural (Van Der Veen, 2016).

So, it could be the case that consumers with high health knowledge and health valuation are more aware of the unhealthiness of these products with their misleading marketing slogans. Then the actual calories are exceeding their expected levels, which lead to a lower value attached to the health attribute and a lower willingness to pay, compared to the consumers with low health knowledge and health valuation. The consumers with low health knowledge and health valuation are maybe less aware of the misleading practices of the less healthy products and therefore attach a higher value to the health attribute, no matter what actually happens.

Because diversity in food choice could also exist between consumers who differ in their stated health knowledge and actual health knowledge, the second question was stated as follows: ''*Are there any differences in the food choice between consumers who say they have a high health knowledge but in fact score low on health knowledge and consumers who say they have a high health knowledge and indeed score high on health knowledge?*''.

The second finding of this paper implies that diversity again exists between the different groups of consumers in the value attached to the health attribute, and also in the expected direction. Consumers who say they have a high health knowledge but in fact score low on health knowledge attach more value to the health attribute than consumers who say they have a high health knowledge and indeed score high on health knowledge, which is in line with the second hypothesis and with the literature described in section 2 as well.

The third and last question investigates whether the consumers' experimental food choices match with their actual eating behavior: *''Do consumers who score different on health knowledge and health valuation automatically vary in their actual eating behavior?''*

The last finding of this paper suggests that the means of the ''actual eating behavior''-variables are not significantly different (expect for one minor variable) between the different groups. This means that consumers who score different on health knowledge and health valuation do not automatically vary in their actual eating behavior. Hence, this finding is in line with the third hypothesis and with the described literature as well.

Since all the sub questions are addressed, the main research question can now be answered, which was formulated as follows:

"How do differences in health knowledge and health valuation between consumers affect the food choice of these consumers with respect to usual dinner meals at home?"

Diversity exists between the groups of consumers, which differ in health knowledge and health valuation, in the value attached to the health attribute of the dinner meal. First, consumers who score high on actual health knowledge and health valuation attach less value to the health attribute and have a lower willingness to pay for a healthier meal, compared to consumers who score low on actual health knowledge and health valuation. Second, consumers who say they have a high health knowledge but in fact score low on health knowledge attach more value to the health attribute than consumers who say they have a high health knowledge and indeed score high on health knowledge. In addition, the differences in health knowledge and health valuation between consumers do not affect their food choice in terms of the other attributes of the meal (price, cooking time and taste). It is namely not the case that the groups which attach a higher value to the health attribute attach lower values to the other attributes. But, in general, the value attached to the health attribute is the highest value attached compared to the values attached to the other attributes. Finally, consumers who score different on actual health knowledge and health valuation do not automatically vary in their actual eating behavior, which suggests that the consumers' experimental food choices do not match with their actual eating behavior.

6. Managerial Implications

It is essential for food retailers to take the trend to healthier products into account, because this trend has a big impact on brands. Brands which produce products with a lot of sugar for example face a decline in their sales, while brands that consistently respond to the reduction of sugars in its products and insist in its commercials and with its products on a consciously healthy food choice face a raise in their sales (ANP, 2016). Furthermore, one of the findings of this paper indicates that the value attached to the health attribute is the highest value attached compared to the values attached to the other attributes (price, cooking time and taste), which suggests that the health attribute is really important nowadays. Therefore, retailers need to take the healthiness of their products very seriously and they have to take this into consideration with respect to the ideal composition of their products.

Furthermore, the image of these retailers need to be in line with their actual products. According to research in consumer trust by the Dutch Food Industry Federation (FNLI), it is namely the case that a lot of consumers are concerned about their food: less than a quarter of the consumers believe that retailers are honest about the ingredients in their products, more than half of the consumers believe that food is manipulated too much, and retailers do not do enough to make their products healthy and sustainable according to the consumers (Van Dongen, 2016). Therefore, if retailers want to regain the confidence of the consumers, they have to list fairly what is actually in their products to match their image with their products.

Moreover, one of the findings of this paper shows that diversity exists between consumers in the value attached to the health attribute, where consumers who score high on actual health knowledge and health valuation attach less value to the health attribute and have a lower willingness to pay for a healthier product, compared to consumers who score low on actual health knowledge and health valuation. A possible explanation for this finding was that when objective calorie levels were higher than expected, purchase intentions were lower, and that the percentage of consumers choosing the more healthful items decreased when actual calories were disclosed and exceeded expected levels (Burton, Howlett, & Tangari, 2009). Hence, if a retailer of a certain brand insists on its very healthy image, but its actual products are not that healthy, it could work in a wrong and reverse way for this retailer. To avoid distrustful consumers this retailer does not need to create illusions, e.g. no images of fresh fruit if the product only consists of artificial aromatic substances and flavorings. This is because consumers with a high health knowledge and health valuation are probably better aware of the contradiction between this retailer's image and its actual products (compared to consumers with a low health knowledge and health valuation), and therefore attach less value to the health attribute and have a lower willingness to pay for those products. These consumers are probably also better aware

of the earlier described misleading marketing slogans of the less healthy products that put us in the wrong direction. So, it is really important for the retailer to match his image with its actual sold products to regain the confidence of the consumers.

However, the match between the image of a retailer and its products, could depend on the targeting policies of this retailer. Namely, only the consumers with high health knowledge and health valuation attach less value to the health attribute and have a lower willingness to pay, and not the consumers with low actual health knowledge and health valuation. The consumers with low actual health knowledge and health valuation attach a higher value to the health attribute no matter what actually happens, because these consumers are probably not aware of the contradiction between the image and the less healthy products of the retailer and of the misleading marketing slogans. Hence, if the retailer targets his policies on these consumers, it is probably not necessary to completely match his image with its products. But, it seems logical that if a retailer insists on its very healthy image, this retailer also targets his policies on consumers who care more about their health (so those with a high health knowledge and health valuation). Then it is essential to match the image of this retailer with its products to regain the consumers trust and to increase the value attached to the health attribute and the willingness to pay of the consumers with a high health knowledge and health valuation. Furthermore, a strong match between the image and the products of a retailer enhance the marketing communication integration of this retailers at a corporate level, but also across the marketing mix, across marketing communication instruments and within marketing communication instruments. An integrated marketing communication program is important, because it involves the development, implementation, and evaluation of marketing communication programs using multiple communication options where the design and execution of any communication option (e.g. the product itself sold by the retailer and the image of the retailer) reflects the nature and content of other communication options that also makes up the communication program (Keller, 2001).

Moreover, this paper could also have implications for consumers, because the findings of this paper indicate that the health attribute is really important. Therefore, the consumers could demand healthier products of retailers or do not buy the unhealthy products at all. However, the concerns of the consumers about their food is not always right. Most of the food is namely perfectly safe. But, sometimes an accident occurs (like fraud with meat or food products that are exposed as less healthy than their shiny packaging suggest), which violates the trust in the whole food industry (Van Dongen, 2016). In addition, if a consumer buys for example orange juice for 89 cent, it is not realistic to expect that this orange juice is produced in a full traditional, healthy and sustainable way.

7. Limitations and Directions for Future Research

Firstly, a source for limitations is the methodology of the used data set. It could be the case that the respondents are influenced by which attribute (price, cooking time, taste and health) is presented first, second, third and fourth. Maybe the respondents attach more value to the attributes that show up higher. But, the randomization in which order the attributes are showed makes distortion of the results less likely. The respondents could also be influenced by which choice set is presented first, second and so on. The respondents might pay more attention to the first couple of choice sets than to the last couple of choice sets. But, in general, 18 choice sets is seen as a perfect limit before the respondents get bored. In addition, it could be that the respondents have an intrinsic preference for the left meal (meal A) or the right meal (meal B). Which is not likely, because the intercepts of all the executed regressions are insignificant. Moreover, the diversity between the different groups could differ if the single health attribute is split up into multiple attributes, like calories, sodium and saturated fat. More health knowledge is required then to assess the health attributes compared to the situation of one single health attribute. So, future research could examine the impact of above issues of the methodology on the food choice of the respondents and could investigate what happens with the results if the single health attribute is split up into multiple health attributes.

Secondly, the findings of this paper are related to usual dinner meals at home which one would eat regularly. The choice for dinner seems to be the most relevant one, because dinner is one of the most important meals of the day and contains the largest fraction of nutrients. But, will the results change if the choices of other food products are investigated? For example, consuming of snacks is done more impulsively than a meal for dinner. Therefore, in future research other food products could be used to test if the same results will hold as for dinner meals.

Lastly, the results of this paper cover only the Dutch population. However, health levels vary between different countries (Olsen & Dahl, 2007) and people from different countries vary in their health beliefs (Haase, Steptoe, Sallis, & Wardle, 2004). Hence, the results may be different across other countries. Future research could investigate if the results are different between countries.

Finally, an interesting option for future research is to examine the influence of a mismatch between the image and the products of a retailer and his misleading marketing slogans on the food choice of the different consumers. Are consumers with high health knowledge and health valuation indeed better aware of the possible contradiction of the retailer's image and its products than consumers with low health knowledge and health valuation? And are these consumers (with high health knowledge and health valuation) therefore attaching less value to the health attribute and have a lower willingness to pay for those products or is that due to something else?

8. Conclusion

Nowadays there is a big trend to healthy products and products with a healthy image, which has a big impact on food- and drink retailers. Furthermore, consumers generally understand the connection between food and health, and many have an interest in doing something about it, but the degree of interest differs between consumers. However, there is a lack of knowledge on the possible drivers and underlying reasons for the choice of such healthy products. Therefore, this paper has examined how differences in health knowledge and health valuation between consumers affect the food choice of these consumers with respect to usual dinner meals at home (which differ in price, cooking time, taste and health).

The findings of this paper indicate that diversity exists between the consumers in the value attached to the health attribute of the dinner meal. First, consumers with high actual health knowledge and health valuation attach less value to the health attribute and have a lower willingness to pay for a healthier product, compared to consumers with low actual health knowledge and health valuation. Second, consumers who say they have a high health knowledge but in fact score low on health knowledge attach more value to the health attribute than consumers who say they have a high health knowledge and indeed score high on health knowledge. In addition, the value attached to the health attribute is the highest value attached compared to the values attached to the other attributes for all consumers. Finally, consumers who score different on health knowledge and health valuation do not automatically vary in their actual eating behavior, which suggests that the consumers' experimental food choices do not match with their actual behavior.

Hence, for food retailers it is essential to take the trend to healthier products into account, because this trend has a big impact on brands. Brands which produce products with a lot of sugar for example face a decline in their sales, while brands that consistently respond to the reduction of sugars in its products and insist in its commercials and with its products on a consciously healthy food choice face a raise in their sales. And one of the findings of this paper indicates that the value attached to the health attribute is the highest value compared to the values attached to the other attributes, which suggests that retailers need to take the healthiness of their products very seriously and they have to take this into consideration with respect to the ideal composition of their products. In addition, the image of these retailers need to be in line with their actual products. A lot of consumers are namely concerned about their food. Therefore, if retailers want to regain the confidence of the consumers, they have to list fairly what is actually in their products to match their image with their products and to increase the value attached to the health attribute and the willingness to pay of the consumers with a high health knowledge and health valuation. Finally, consumers could demand healthier products of retailers or do not buy the unhealthy products at all.

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Appendix

A.1 Descriptions independent variables/attributes of the meal

- *Price:* How much does the meal cost per person? Think about the total cost of the ingredients if it is a self-made dish. Consider the total amount you pay if it is take-out or ready-made food. The price varies between (i) 2 Euro, (ii) 6 Euro, and (iii) 10 Euro per person.
- *Cooking time:* How much time does it take before the meal is on your plate? This is the total time including traveling time and preparation time. The time varies between (i) 10 minutes, (ii) 30 minutes, and (iii) 50 minutes.
- *Taste:* How does the meal taste? Is it (i) edible (just ok), (ii) good (pretty good), or (iii) delicious (very good)?
- *Health:* How healthy is the meal? Is it (i) unhealthy (repeated intake can be harmful to health and increases the risk of disease), (ii) healthy neutral, or (iii) healthy (contributes to good resistance and protects against disease).

A.2 Actual health knowledge (12 health statements)

1. Experts recommend a daily intake of about 2,500 calories for men and about 2,000 calories for women. *(True)*
2. Experts advise that approximately 30% of the total number of calories in a day consists of saturated fat. *(False)*
3. Experts advise to limit sodium at dinner to a maximum of 1,500 milligrams. *(False)*
4. It is good for health to limit the intake of foods high in added sugars. (Tru*e)*
5. Experts recommend eating many different types of vegetables, especially dark green, red, and orange vegetables. *(True)*
6. According to the experts, meat, chicken, fish, and eggs are the main ingredient of our meals. *(False)*
7. Eating whole-wheat bread has no positive effect on health. *(False)*
8. Taking a large amount of saturated fat can prevent cardiovascular disease. *(False)*
9. Even without overweight poor diet can lead to cardiovascular disease, high blood pressure, and type 2 diabetes. *(True)*
10. Sodium is a part of sugar. *(False)*
11. Eating enough fruits and vegetables is associated with a lower risk of some chronic diseases. *(True)*
12. Intake of excessive sodium can lead to high blood pressure and cardiovascular disease. *(True)*

A.3 Categories control variables

- *Gender:* 1.) Male and 2.) Female
- *Age:* 1.) 14 years and younger, 2.) 15 - 24 years, 3.) 25 - 34 years, 4.) 35 - 44 years, 5.) 45 - 54 years, 6.) 55 - 64 years and 7.) 65 years and older
- *Education:* 1.) Primary school, 2.) VMBO (intermediate secondary education, US: junior high school), 3.) Havo VWO (higher secondary education/preparatory university education, US: senior high school), 4.) MBO (intermediate vocational education, US: junior college), 5.) HBO (higher vocational education, US: college) and 6.) WO (university)
- *Net monthly income:* 0.) No income, 1.) EUR 500 or less, 2.) EUR 501 to EUR 1000, 3.) EUR 1001 to EUR 1500, 4.) EUR 1501 to EUR 2000, 5.) EUR 2001 to EUR 2500, 6.) EUR 2501 to EUR 3000, 7.) EUR 3001 to EUR 3500, 8.) EUR 3501 to EUR 4000, 9.) EUR 4001 to EUR 4500, 10.) EUR 4501 to EUR 5000, 11.) EUR 5001 to EUR 7500, 12.) More than EUR 7500, 13.) I really don't know and 14.) I prefer not to say *(Note: option 13 and 14 are not included in the analysis)*

B.1 Frequency table control variables

	Frequency	*Percent*
Gender		
Male	601	49.8
Female	605	50.2
Total	1206	100.0
Age		
14 years and younger	213	17.7
15 - 24 years	185	15.3
25 - 34 years	151	12.5
35 - 44 years	158	13.1
45 - 54 years	152	12.6
55 - 64 years	166	13.8
65 years and older	181	15.0
Total	1206	100.0
Education		
Primary school	237	19.7
VMBO	224	18.6
HAVO/VWO	129	10.7
MBO	206	17.1
HBO	221	18.3
WO	109	9.0
Missing	80	6.6
Total	1206	100.0
Income		
No income	334	27.7
EUR 500 or less	81	6.7
EUR 501 to EUR 1000	146	12.1
EUR 1001 to EUR 1500	169	14.0
EUR 1501 to EUR 2000	171	14.2
EUR 2001 to EUR 2500	119	9.9
EUR 2501 to EUR 3000	51	4.2
EUR 3001 to EUR 3500	21	1.7
EUR 3501 to EUR 4000	10	.8
EUR 4001 to EUR 4500	3	.2
EUR 4501 to EUR 5000	2	.2
EUR 5001 to EUR 7500	6	.5
More than EUR 7500	2	.2
I really don't know	35	2.9
I prefer not to say	48	4.0
Missing	8	.7
Total	1206	100.0

B.2 Descriptive statistics ''actual eating behavior''-variables

	N	*Min*	*Max*	*Mean*	*St. dev*
How often do you eat the following food items?					
Fruits	1203	1	6	4.81	1.37
Vegetables	1203	1	6	5.26	.92
Candy	1203	1	6	3.11	1.38
Soft drinks	1203	1	6	2.79	1.59
Snacks	1203	1	6	2.54	1.02
How often do you choose the following options for dinner?					
Home cooking based on individual ingredients	1203	1	6	4.84	1.03
Home cooking based on ready-made food (e.g. frozen food, salad, world cuisine, etc.)	1203	1	6	2.00	.89
A take out or delivery meal	1203	1	6	1.72	.66
Eat in a restaurant	1203	1	6	1.86	.51

Note: never(1), less than once a week(2), 1 to 2 times a week(3), 3 to 4 times a week(4), 5 to 6 times a week(5), every day(6).

B.3 Numbers key health variables

Actual health knowledge	*Correct*
Experts recommend a daily intake of about 2,500 calories for men and about 2,000 calories for women. (True)	72.64%
Experts advise that approximately 30% of the total number of calories in a day consists of saturated fat. (False)	39.39%
Experts advise to limit sodium at dinner to a maximum of 1,500 milligrams. (False)	19.32%
It is good for health to limit the intake of foods high in added sugars. (True)	87.56%
Experts recommend eating many different types of vegetables, especially dark green, red, and orange vegetables. (True)	65.51%
According to the experts, meat, chicken, fish, and eggs are the main ingredient of our meals. (False)	67.74%
Eating whole-wheat bread has no positive effect on health. (False)	65.09%
Taking a large amount of saturated fat can prevent cardiovascular disease. (False)	54.15%
Even without overweight poor diet can lead to cardiovascular disease, high blood pressure, and type 2 diabetes. (True)	89.30%
Sodium is a part of sugar. (False)	68.41%
Eating enough fruits and vegetables is associated with a lower risk of some chronic diseases. (True)	73.30%
Intake of excessive sodium can lead to high blood pressure and cardiovascular disease. (True)	78.52%
Number of average correct answers	7.8 out of 12
Health valuation	
*totally disagree(1), disagree(2), neutral(3), agree(4), totally agree(5)	*Average*
If you don't have your health, you don't have anything.	3.74
There is nothing more important than good health.	3.94
There are many things that I care about more than my health.	2.25
Good health is of only minor importance in a happy life.	2.53
If you don't have your health, you don't have anything + There is nothing more important than good health.	7.63
There are many things that I care about more than my health + Good health is of only minor importance in a happy life.	4.75
Stated health knowledge	
*very low(1), low(2), intermediate(3), good(4) and very good(5)	*Average*
How would you rate your knowledge about health matters?	3.46

C.1 Multinomial logistic regression output control variable ''gender''

	Parameter Estimates		WTP for 1 unit increase
	β	*Exp(β)*	
Constant	-.016 *(.016)*	-	-
Price	-.096* *(.006)*	.91	-
Cooking time	-.011* *(.001)*	.99	-.011/.096 = - €0.11
Taste	.20* *(.017)*	1.23	.20/.096 = €2.13
Health	.91* *(.032)*	2.49	.91/.096 = €9.49
*Price*male*	-.003 *(.009)*	1.00	-
*Cooking time*male*	.001 *(.001)*	1.00	-.011/.096 = - €0.11
*Taste*male*	.005 *(.025)*	1.01	.20/.096 = €2.13
*Health*male*	.025 *(.046)*	1.025	.91/.096 = €9.49

*Note: standard errors are in parentheses, the symbol * indicates that the coefficients are statistically significant at the 5 percent level, the group ''female'' serves as base group.*

C.2 Multinomial logistic regression output control variable ''age''

	Parameter Estimates		WTP for 1 unit increase
	β	*Exp(β)*	
Constant	-.016 *(.016)*	-	-
Price	-.095* *(.011)*	.91	-
Cooking time	-.009* *(.002)*	.99	-.009/.095 = - €0.095
Taste	.27* *(.031)*	1.31	.27/.095 = €2.83
Health	.94* *(.057)*	2.56	.94/.095 = €9.89
Price(14 years and younger)*	.006 *(.016)*	1.01	-
Cooking time(14 years and younger)*	-.001 *(.002)*	1.00	-.009/.095 = - €0.095
Taste(14 years and younger)*	-.075 *(.085)*	.93	.27/.095 = €2.83
Health(14 years and younger)*	-.074 *(.046)*	.93	.94/.095 = €9.89
Price(15-24 years)*	-.012 *(.016)*	.99	-
Cooking time(15-24 years)*	-.001 *(.002)*	1.00	-.009/.095 = - €0.095
Taste(15-24 years)*	-.042 *(.043)*	.96	.27/.095 = €2.83
Health(15-24 years)*	.010 *(.081)*	1.01	.94/.095 = €9.89
Price(25-34 years)*	-.012 *(.017)*	.99	-
Cooking time(25-34 years)*	-.003 *(.003)*	1.00	-.009/.095 = - €0.095
Taste(25-34 years)*	-.12* *(.047)*	.89	(.27 - .12)/.095 = €1.61
Health(25-34 years)*	-.058 *(.088)*	.94	.94/.095 = €9.89
Price(35-44 years)*	-.007 *(.016)*	.99	-
Cooking time(35-44 years)*	-.004 *(.002)*	1.00	-.009/.095 = - €0.095
Taste(35-44 years)*	-.088 *(.045)*	.92	.27/.095 = €2.83
Health(35-44 years)*	.091 *(.085)*	1.10	.94/.095 = €9.89
Price(45-54 years)*	.000 *(.017)*	1.00	-
Cooking time(45-54 years)*	-.001 *(.003)*	1.00	-.009/.095 = - €0.095
Taste(45-54 years)*	-.17* *(.045)*	.85	(.27 - .17)/.095 = €1.08
Health(45-54 years)*	-.033 *(.085)*	.97	.94/.095 = €9.89
Price(55-64 years)*	.009 *(.016)*	1.01	-
Cooking time(55-64 years)*	-.001 *(.002)*	1.00	-.009/.095 = - €0.095
Taste(55-64 years)*	.023 *(.045)*	1.02	.27/.095 = €2.83
Health(55-64 years)*	-.047 *(.083)*	.95	.94/.095 = €9.89

*Note: standard errors are in parentheses, the symbol * indicates that the coefficients are statistically significant at the 5 percent level, the group ''65 years and older'' serves as base group.*

C.3 Multinomial logistic regression output control variable ''education''

	Parameter Estimates		WTP for 1 unit increase
	β	*Exp(β)*	
Constant	-.016 *(.016)*	-	-
Price	-.10* *(.014)*	.90	-
Cooking time	-.012* *(.002)*	.99	-.012/.10 = - €0.12
Taste	.24* *(.041)*	1.27	.24/.10 = €2.34
Health	1.07* *(.076)*	2.91	1.07/.10 = €10.48
Price(primary school)*	.004 *(.017)*	1.00	-
Cooking time(primary school)*	.001 *(.003)*	1.00	-.012/.10 = - €0.12
Taste(primary school)*	-.045 *(.048)*	.96	.24/.10 = €2.34
Health(primary school)*	-.18* *(.090)*	.83	(1.07 - .18)/.10 = €8.72
Price(VMBO)*	.010 *(.018)*	1.01	-
Cooking time(VMBO)*	.002 *(.003)*	1.00	-.012/.10 = - €0.12
Taste(VMBO)*	-.002 *(.049)*	1.00	.24/.10 = €2.34
Health(VMBO)*	-.048 *(.092)*	.95	1.07/.10 = €10.48
Price(Havo VWO)*	.001 *(.020)*	1.00	-
Cooking time(Havo VWO)*	.002 *(.003)*	1.00	-.012/.10 = - €0.12
Taste(Havo VWO)*	-.083 *(.055)*	.92	.24/.10 = €2.34
Health(Havo VWO)*	-.22* *(.10)*	.81	(1.07 - .22)/.10 = €8.36
Price(MBO)*	-.006 *(.018)*	.99	-
Cooking time(MBO)*	.001 *(.003)*	1.00	-.012/.10 = - €0.12
Taste(MBO)*	-.042 *(.050)*	.96	.24/.10 = €2.34
Health(MBO)*	-.075 *(.094)*	.93	1.07/.10 = €10.48
Price(HBO)*	.015 *(.018)*	1.01	-
Cooking time(HBO)*	.002 *(.003)*	1.00	-.012/.10 = - €0.12
Taste(HBO)*	-.023 *(.049)*	.98	.24/.10 = €2.34
Health(HBO)*	-.29* *(.091)*	.75	(1.07 - .29)/.10 = €7.62

*Note: standard errors are in parentheses, the symbol * indicates that the coefficients are statistically significant at the 5 percent level, the group ''WO'' serves as base group.*

C.4 Multinomial logistic regression output control variable ''net monthly income''

	Parameter Estimates		WTP for 1 unit increase
	β	*Exp(β)*	
Constant	-.015 *(.016)*	-	-
Price	-.23* *(.11)*	.80	-
Cooking time	-.030* *(.014)*	.97	-.030/.23 = - €0.13
Taste	.70* *(.35)*	2.01	.70/.23 = €3.07
Health	1.54* *(.63)*	4.68	1.54/.23 = €6.80
Price(no income)*	.13 *(.11)*	1.14	-
Cooking time(no income)*	.020 *(.017)*	1.02	-.030/.23 = - €0.13
Taste(no income)*	-.49 *(.35)*	.61	.70/.23 = €3.07
Health(no income)*	-.67 *(.61)*	.51	1.54/.23 = €6.80
Price(EUR 500 or less)*	.13 *(.12)*	1.14	-
Cooking time(EUR 500 or less)*	.018 *(.017)*	1.02	-.030/.23 = - €0.13
Taste(EUR 500 or less)*	-.45 *(.35)*	.64	.70/.227 = €3.07
Health(EUR 500 or less)*	-.33 *(.64)*	.72	1.54/.227 = €6.80
Price(EUR 501-1000)*	.14 *(.11)*	1.16	-
Cooking time(EUR 501-1000)*	.020 *(.017)*	1.02	-.030/.23 = - €0.13
Taste(EUR 501-1000)*	-.50 *(.35)*	.60	.70/.23 = €3.07

Health(EUR 501-1000)*	-.67 *(.63)*	.51	1.54/.23 = €6.80
Price(EUR 1001-1500)*	.12 *(.11)*	1.13	-
Cooking time(EUR 1001-1500)*	.020 *(.017)*	1.02	-.030/.23 = - €0.13
Taste(EUR 1001-1500)*	-.50 *(.35)*	.61	.70/.23 = €3.07
Health(EUR 1001-1500)*	-.66 *(.63)*	.52	1.54/.23 = €6.80
Price(EUR 1501-2000)*	.13 *(.11)*	1.14	-
Cooking time(EUR 1501-2000)*	.021 *(.017)*	1.02	-.030/.23 = - €0.13
Taste(EUR 1501-2000)*	-.48 *(.35)*	.62	.70/.23 = €3.07
Health(EUR 1501-2000)*	-.53 *(.63)*	.59	1.54/.23 = €6.80
Price(EUR 2001-2500)*	.11 *(.11)*	1.12	-
Cooking time(EUR 2001-2500)*	.018 *(.017)*	1.02	-.030/.23 = - €0.13
Taste(EUR 2001-2500)*	-.55 *(.35)*	.58	.70/.23 = €3.07
Health(EUR 2001-2500)*	-.64 *(.63)*	.53	1.54/.23 = €6.80
Price(EUR 2501-3000)*	.14 *(.12)*	1.15	-
Cooking time(EUR 2501-3000)*	.020 *(.017)*	1.02	-.030/.23 = - €0.13
Taste(EUR 2501-3000)*	-.41 *(.35)*	.66	.70/.23 = €3.07
Health(EUR 2501-3000)*	-.70 *(.64)*	50	1.54/.23 = €6.80
Price(EUR 3001-3500)*	.067 *(.12)*	1.07	-
Cooking time(EUR 3001-3500)*	.020 *(.018)*	1.02	-.030/.23 = - €0.13
Taste(EUR 3001-3500)*	-.38 *(.36)*	.69	.70/.23 = €3.07
Health(EUR 3001-3500)*	-.42 *(.65)*	.66	1.54/.23 = €6.80
Price(EUR 3501-4000)*	.22 *(.12)*	1.25	-
Cooking time(EUR 3501-4000)*	.020 *(.019)*	1.02	-.030/.23 = - €0.13
Taste(EUR 3501-4000)*	-.61 *(.38)*	.54	.70/.23 = €3.07
Health(EUR 3501-4000)*	-.38 *(.68)*	.68	1.54/.23 = €6.80
Price(EUR 4001-4500)*	.21 *(.14)*	1.24	-
Cooking time(EUR 4001-4500)*	.026 *(.021)*	1.03	-.030/.23 = - €0.13
Taste(EUR 4001-4500)*	-.25 *(.44)*	.78	.70/.23 = €3.07
Health(EUR 4001-4500)*	-1.17 *(.74)*	.31	1.54/.23 = €6.80
Price(EUR 4501-5000)*	-.18 *(.21)*	.83	-
Cooking time(EUR 4501-5000)*	.027 *(.024)*	1.03	-.030/.23 = - €0.13
Taste(EUR 4501-5000)*	-.61 *(.48)*	.54	.70/.23 = €3.07
Health(EUR 4501-5000)*	-.061 *(1.10)*	.94	1.54/.23 = €6.80
Price(EUR 5001-7500)*	.23 *(.13)*	1.26	-
Cooking time(EUR 5001-7500)*	-.008 *(.021)*	.99	-.030/.23 = - €0.13
Taste(EUR 5001-7500)*	-.48 *(.40)*	.62	.70/.23 = €3.07
Health(EUR 5001-7500)*	-.37 *(.72)*	.69	1.54/.23 = €6.80

*Note: standard errors are in parentheses, the symbol * indicates that the coefficients are statistically significant at the 5 percent level, the group ''More than EUR 7500'' serves as base group.*