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Title: The effect of taste-focused labelling on healthy food consumption

Name: T. W. Hak
Student number: 582304
Supervisor: K.I.M. Rohde
Second assessor: C. Li
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Abstract

Globally, the number of obese and overweight people is increasing, which is a consequence of consuming too much fat and energy-dense foods. This has negative impact on the health of individuals, it increases social health costs, and this type of food industry has a negative impact on the environment. Thus, from a health, social and environmental perspective, it is rational for people to make healthier food choices. Yet, people often fail to do so because of an environment that promotes cheap, tasty but unhealthy food. Because of the successful way unhealthy food is portrayed, people make a tasteful association with it, and this strongly influences food choices. This research uses people's positive association with tasty food to see if it can increase the choice for healthy meals in restaurants, where we qualify the vegetarian option as the healthy one. Subjects were divided among three groups, the control group, where the healthy option was labelled basic, the health-focused treatment group, where the healthy option was labelled healthy, and the taste-focused treatment group, where the healthy option was labelled tastefully. To see if labelling has an effect, the participants were asked five times to choose from several options, during five different types of courses. The outcomes of these choices formed a score, the health score, which was compared between the control, health-focused and taste-focused groups. As hypothesized, results of an ordered logistic regression reveal significant higher consumption of vegetarian dishes, thus a higher health score, in the taste-focused treatment group. Also, a significant negative effect of health-focused labelling was observed. Furthermore, factors behind consumption were being studied, being expected taste, expected healthiness and the general opinion of the taste of healthy food. Regression analysis revealed a negative effect of healthy labelling on expected taste, and we observe a negative effect of tasteful labelling on expected healthiness. The results of this study imply that if we want people to choose healthier options, it can be a low-cost and effective solution to focus the description of a vegetarian meal on taste and not on healthiness.

Keywords: labelling, food, taste, health, vegetarian, obesity, intervention, nutrition

Table of contents

1. Introduction

Overweight and obesity are among the greatest health problems of our time. Numbers of obesity have tripled since 1975 and continue to rise. In recent decades, incomes have risen rapidly, and the food production industry has grown as well. As a result, all kinds of unhealthy foods have become widely available to a large part of the world's population. Previously, obesity was known as a problem for the richer countries where average incomes are higher, but today, this is no longer the case as obesity is on the rise in low- and middle-income countries. Most people in the world live in countries where being overweight is a greater cause of death than being underweight. In 2016, about 39% of the adult world population was overweight and 13% was obese (WHO, 2021). Therefore, the World Health Organization speaks about an obesity pandemic.

An individual is overweight when their Body Mass Index (BMI), a simple index of an individual's weight (kg) divided by squared height (m), is greater than or equal to 25. An individual is obese when this number is greater than 30 (WHO, 2021). When the weight, and corresponding BMI, of a person increases, health risks increase as well. For example, obesity increases the risk of diabetes, high cholesterol levels and increased blood pressure. These factors increase the risk of cardiovascular disease, such as heart attack and stroke. Further, there is an increased risk of developing different forms of cancer. Other physical conditions, due to the increased pressure on the body, are complaints in the joints and muscles. Also, being overweight can cause sleeping problems, leading to overtiredness (Maxima MC, 2018). All these factors result to obesity being one of the biggest causes of premature death. It was linked to 8% of global deaths in 2017 (WHO, 2021).

The social costs of overweight and obesity can be viewed upon in different ways. In one way, there are the costs of the healthcare institutions. As mentioned before, higher weight leads to more health complications. Treatments of these health problems all have a price, and these hospital costs are often covered by governments and health insurance companies, which in many cases are compulsorily funded by the insured and tax paying population. It is estimated that the costs of obesity are among 2-8% of healthcare budgets internationally (Rossner, 2002). From a different perspective, there are lost revenues from people not working or working less productively because of their physical retardation. Missed social revenues are,

for example, lower tax payments and lower or contributions to a country's GDP due to lower or no productivity. These costs remain hard to estimate, since they depend on many variables.

The cause of excessive weight is simply that a person over a longer period eats more calories than that the person expends. This results in excess fat to be stored in the body. In general, the problem is a combination of two factors. The first factor is high consumption of energy-dense foods that are often high in fats or sugars, thus in calories. The second factor is low physical activity resulting in less burned calories (Voedingscentrum, 2022). The focus of this research will be on influencing the behaviour regarding diet, although diet and exercise can have positive crossover effects on each other (Martins, Robertson, & Morgan, 2008). There can be many different reasons why a person gains weight through nutrition. Weight can, for example, be gained by simply eating too large portions, by eating meals with a high energy density or by drinking too many alcoholic or sugary drinks, as both types of drinks are high in calories (Voedingscentrum, 2022).

Many studies have investigated health complications of following a diet with meat and processed meat intake. When meat is consumed, it is a direct intake of food that is high in energy and in fats, so excessive intake can lead to an increase in weight. Still, it is particularly difficult to look at a meat diet and its direct relationship to obesity. This is because obesity depends on many different factors. One person can start eating twice as much meat as another, but if that person also does significantly more sports and drinks only water instead of sugary drinks, there may not occur a difference in BMI. Interventions that focus on one decreasing one factor, such as fat intake, seem to be ineffective in battling increasing obesity rates (Willett & Leibel, 2002). Still, eating too much red meat (over 100 grams a day) and processed meat (over 50g a day) is associated with a higher risk of having a stroke, type 2 diabetes, colon cancer and lung cancer. Partly because of this, government subsidised institutions recommend limiting meat intake to 500 grams a weak and avoiding processed meat consumption (Voedinscentrum, 2022). The negative health effects of a diet rich in meat are further highlighted in the literature review section of this thesis. In contrast with high meat intake diets, a diet that is rich in vegetables and fruit has a strong positive impact on general health. It can lead to lower blood pressure, reduces heart disease risks, and lowers the risk of several forms of cancer. (Voedingscentrum, 2022). Other studies show that adults and children who follow a vegetarian diet have lower BMIs, lower average weights, and less prevalence of obesity (Grantham, Staub, & Ruhli, 2014) (Tuso, Ismail, Ha, & Bartolotto,

2013). Wrong choices of nutrition in general are among the biggest factors for diseases worldwide, and one of the biggest reasons for the obesity pandemic (Lim & Vos, 2013).

An additional argument for eating more vegetables and less meat is the impact of the meat industry on the environment. Westhoek et al. (2011) and found that the global livestock population is responsible for about one fifth (22%) of all emissions. These emissions are a result of several components: emissions from animals themselves, animal food production, deforestation for farmland or the transport or processing of meat products. The increasing impact of these factors is due to the enormous growth of the industrialised animal sector. McMichael et al. (2007) provide evidence that an essential way to counteract to reduce the negative consequences for health and the environment is to reduce average meat consumption. Stehfest et al. (2007) estimate that a global transition to a diet with structurally less meat could reduce the costs of mitigating the effects of climate change by 50% by 2050. Therefore, with the consequences for individual health, social costs, and the environment in mind, we choose to advocate in favour of vegetarian meals in this research.

If we consider the effects on health, society and the environment, it seems obvious that people should eat more vegetables and less meat. Unfortunately, it is not easy for people to make this right choice. Unhealthy foods are widely available, inexpensive, and heavily marketed. This environment makes people choose food that is tasty and cheap in the short term but unhealthier in the long term. The present-biased preference, placing more value on momentary pleasure relative to future benefits, often leads to burgers over salad. In addition, people tend to have too positive intentions and overestimate their future actions. For example, it is often thought that eating badly today will be compensated by exercising tomorrow, but this promise is rarely kept (Roberto & Kawachi, 2014). The field of Behavioural Economics combines economics and psychology and investigates the differences in how people should behave rationally versus how people actually behave. It highlights how biases in thoughts, perception or memory influence human decision making. This field can therefore provide the right insights into the global obesity problem, as there is a (too) big difference between what rational people would eat and what people actually choose to eat.

In the book *Nudge: improving decisions about health, wealth, and happiness* Thaler and Sunstein describe behavioural insights into how people can make better choices without limiting their freedom of choice. The idea of Libertarian Paternalism describes how private

institutions and governments can alter people's choice environments to let them make better long-term choices for themselves. By designing products or environments in a different way, people are ‘nudged’ towards a better choice. (Thaler & Sunstein, 2008). Nudging people towards a healthier diet has the potential to create a healthier population in a cheap, simple, and effective way.

Governments worldwide recognised this and have tried certain interventions to make people more aware of their (food) choices. One of the most used interventions is nutritional labelling. This label indicates the nutritional value of each product. A nutritional label contains information about calories, salt, sugars, and energy intake. In some countries an overall score, certain healthy terms (best choice, light) or a certain 'traffic light' colour is added to indicate how healthy product chosen is (Roberto & Kawachi, 2014). One of the key problems with nutritional labelling is that the essential values are often presented in grams and milligrams accompanied by percentages. Serving sizes mostly appear in cups, in portions, or plates. Consumers must calculate for themselves how much of the nutritionally labelled product ultimately ends up on their plates and how that relates to their daily intake. Psychologists describe human thinking in two ways: System 1 thinking which happens effortless and quick, and System 2 thinking which requires effort and is slower. Food choices are often made quickly using System 1, while nutritional balancing of a good meal based on the label requires System 2 thinking. The same problems occur when people who want to lose weight and are advised to count calories, or when doctors tell a person is obese based on the person’s BMI. This requires people to think effortful and sometimes to do calculations themselves, which is too much for many when it comes to food choices and being overweight (Roberto & Kawachi, 2014). Therefore, it may be a better idea to steer people in the right direction in a simpler way.

Another problem with nutritional labels, and food descriptions in general, is that emphasizing the healthiness of a product does not lead to higher consumption and intake (Turnwald & Crum, 2019). There is evidence at people focus primarily on taste when making food choices (Aggarwal, Rehm, Monsivais, & Drewnowski, 2016). However, we often see descriptions of healthy foods where the focus is mainly on the healthiness of the product or meal. For example, large restaurant chains choose to describe the menu with the lowest number of calories as the 'healthy choice'. Soft drink producers choose to label the sugar-free variations of their products as 'light'. The emphasis is on the healthiness, often the product being low in

calories, fat, or sugar. Focussing food labels and descriptions on the number of calories does not improve people's food choices (Bleich, Economos, & Spiker, 2017). Yet we see that large American restaurant chains (over 10,000 locations) choose to use less appealing and attractive descriptions for their healthy options (Turnwald, Jurafsky, Conner, & Crum, 2017). The focus is more on the healthiness of the meal, rather than the taste.

Making matters worse, healthy labelling of food leads to the opposite effect than for which it is intended. Research has shown that healthy labelled food is perceived as less tasty. People tend to hold the mindset that the unhealthier the food is, the better it tastes. Evidence has also been found for the inverse relationship - the healthier the food portrayed, the worse the food is perceived to be (Raghunathan, Naylor, & Hoyer, 2006). Also, healthier food is experienced as less filling and less appealing (Fenko, Kersten, & Bialkova, 2016) (Suher, Raghunathan, & Hoyer, 2016). All these consequences resulting from healthy labelling of food do not make people develop long term preferences for healthy foods. Therefore, due to the clear limits of health-labelling, we need to look at other ways of presenting healthy options to encourage people to make healthy choices.

From the research of Raghunathan et al. (2006), we learned that the unhealthier de food is portrayed, the better the perceived taste. Taste has always been a more important factor in food choices than healthiness. It often comes down to the expected idea of taste winning over the healthy message surrounding the product or meal (Aggarwal, Rehm, Monsivais, & Drewnowski, 2016. Glanz, Basil, Maibach, Goldberg, & Snyder, 1998). Building on this, several studies have been done on different ways of describing healthy options. Evidence was found that when vegetables were described in an indulgent way, they were chosen significantly more often than when they were described normal or healthy. In an additional study, purchases of taste-focused labelled vegetarian entrees remained constant, while purchases of health-focused labelled vegetarian entrees fell by 45.1% (Turnwald & Crum, 2019).

These insights and results regarding taste-focused labelling of healthy foods create new opportunities and call for further research. This thesis aims to identify the behavioural trigger that could lead to a healthier vegetarian meal choice. It is not to make people think that vegetarian food tastes unhealthy, but it is a way of shifting the focus of vegetarian eating to the tasty and rewarding aspects of it. In this way, we try to use the present-biased preference

for direct gratification from taste to make people choose a healthy vegetarian option. There are various situations where people can be nudged towards a healthier choice in this subtle way. The opportunity to let people make healthier choices by taste-focused labelling of vegetarian choices leads to the following research question:

RQ1: "What is the effect of taste-focused labelling on the consumption of vegetarian dishes?"

This is not the first time that effects of labelling will be examined. A previous study focused on the consumption of small vegetarian side dishes in a university cafeteria, another looked at self-selection of differently described vegetables and another at vegetarian entrees in a restaurant (Turnwald & Crum, 2019). This research will focus on different types of meals, being breakfast, lunch, appetizers, starters, and dining meals, where we will qualify the vegetarian option as the healthiest. The options will be presented to the respondents on a menu card in an online setting. This allows us to see the consumption effect of labelling a vegetarian dish neutral, healthy, or tasty at different meals at different times of the day.

The choice to consume a dish depends on several factors. Besides zooming in on the actual consumption (RQ1), we also want to investigate the effects of labelling on two underlying factors: expected taste and expected healthiness. We do this for expected taste because this is the most important factor when people make food choices (Aggarwal, Rehm, Monsivais, & Drewnowski, 2016) and we do this for expected health because people often do not associate a healthy described meal with a tasty experience, and people do make an unhealthy=tasty association. (Raghunathan, Naylor, & Hoyer, 2006). Therefore, we have developed the following two sub-research questions:

sRQ1: "What is the effect of taste- and health-focused labelling on the expected taste of vegetarian dishes?"
sRQ2: "What is the effect of taste- and health-focused labelling on the expected healthiness of vegetarian dishes?"

Besides the fact that in the experiment, which will be explained later, we investigate expected taste and health of certain vegetarian dishes, we are also curious about how people in general look at the relationship between taste and health. What effect can labelling have on this general mindset? After all, previous literature shows that people make an association between

unhealthy and tasty, and an inverse association between healthy and not tasty. We want to find out whether taste labelling influences the general opinion about taste and health. In Turnwald et al. (2019) research was conducted on how participants look at the general relationship between healthy food and taste. Here, evidence was found that participants who fell into the taste-focused group were more likely to think that, in general, healthy products also tend to taste good. Therefore, we want to include this in this research, and we want to look at the effects of labelling on the general mindset of how people look at the relationship between taste and health. Therefore, we have developed the following sub-research question:

sRQ3: "What is the effect of taste-focused labelling on the general opinion on the relationship between taste and healthy food?"

The rest of the paper is structured as follows. First the essential literature is discussed, followed by a section on the experimental design and data, then the results of the experiment and finally a discussion and conclusion.

2. Literature review

As this thesis is built on several aspects, the literature review will be divided into parts. First, we will discuss important studies that deal with nutrition, and in particular the differences in meat and vegetable intake, then we will look at behavioural economics and interventions related to food consumption and finally we will look at the effects of previous studies on labelling foods. Finally, we formulate our hypotheses based on previous literature.

2.1 Nutrition

In this study, we look at the different descriptions of healthy options and unhealthy options, where the vegetarian option is qualified as healthy during the experiment. Even though there are various unhealthy vegetarian foods (e.g., salted French fries, processed cheese), research generally shows that a vegetarian diet is healthier than a diet high in meat. A high meat diet increases the chances of cardiovascular diseases and cancer (Sing, Sabate, & Fraser, 2003). Furthermore, Larsson et al. (2013) found evidence that increased meat consumption is associated with higher mortality. Additionally, evidence has been found that meat availability is one of the best predictors of a high obesity prevalence (You & Henneberg, 2016). There is a link between eating red and processed meat and stroke. A relatively high consumption of 100 to 120 grams of red meat per day is associated with a higher risk of having a stroke. This concerns brain infarcts and brain haemorrhages. Depending on the type of meat (e.g., beef, pork, chicken) saturated fat makes up for about 35% total fat. This saturated fat increases the risk of heart and vascular disease (Voedinscentrum, 2022).

In contrast to diets rich in meat, the results of vegetarian diets are much more positive. For example, it was found that a vegetarian diet is associated with decreased risk of cardiovascular diseases, cancer, and mortality (Le & Sabate, 2014) (Huang, Yang, Zheng, Wahlqvist, & Li, 2012). Additionally, research revealed that people who follow a vegetarian diet have lower BMIs, lower average weights (Grantham, Staub, & Ruhli, 2014), and less prevalence of obesity (Tuso, Ismail, Ha, & Bartolotto, 2013). An experiment is carried out during this study, which will be described in full later. Based on the above-mentioned studies, we chose the vegetarian option on the menu (in the experiment) as the healthy option. To support this choice, we calculated the estimated calories of the recipes (Appendix E) of all options in the experimental description and ensured that the vegetarian (healthy) option was also the lowest in calories.

2.2 Behavioural interventions on healthy food choices

The field of behavioural economics investigates the gap between rational and actual human behaviour. Initially, it looked at economic (financial) aspects, such as why people find it difficult to save for retirement. Nowadays, it is also applied in contemporary life, for example to try to make humans stop smoking, increase exercise, or lose weight. To help people make healthier food choices, various behavioural interventions have been tested, which will be discussed in this section.

Previous research has looked at our two cognitive thought systems, where in System 1 we rely on fast automatic intuition and in System 2 on slower thoughtful effortful reasoning. This is called dual process theory. Since using System 2 takes more effort, it is observed that its mental capacity is limited. When people are under time-pressure, stress or other information processing tasks, people tend to fall back on quick decision-making using System 1 (Kahneman, 2011). Evidence has been found that these quick decisions are present-biased, which in food choices can lead to picking foods that are enjoyed quickly in the short term but not so in the long term. In a study, two groups were asked to choose between cake and fruit salad. However, one group was instructed to remember a difficult 7-digit sequence of numbers during the choice. It turned out that participants in this group were 50% more likely of choosing cake, since they were forced back on their more impulsive behaviour (Shiv & Fedorikhin, 1999).

Another area where the lack of System 2 thinking is demonstrated is in supermarkets. Here, consumers spend an average of 12 seconds per purchased product, something the marketing and advertisement industry has been capitalising on for years (Thorgeirsson & Kawachi, 2013). This busy fast-paced environment ensures that decisions are made quickly with System 1, instead of rationally looking at the nutritional values using System 2. This was exceptionally illustrated during a survey over 790 Australian adults. When asked, respondents said they preferred a nutritional label showing absolute values in grams and percentages of daily intake, divided into eight categories. However, the consumers were far more likely (up to three times) to identify the healthy products when a ‘traffic-light colour’ was used to indicate the healthiness of the product, instead of the preferred list (Kelly, et al., 2009).

An example of the consequences of the quick thinking of System 1 is that people eat too large portions. This is labelled 'mindless eating'. The amount of food eaten is often strongly influenced by external factors, such as the size of the plate. Research has shown that the size of packages, plates or bowls can cause people to eat 15-45% more. This is an example of anchoring, where an irrational bias (eating too much) is a consequence of relying too much on a pre-existing benchmark (the plate size) (Wansink, Rust, & Payne, 2009). The concept of anchoring was successfully applied to diabetes type 2 patients, where the treatment group received a ‘portion control plate’ and accompanying explanation while the control group just received regular dietary assessment and information. The treatment group showed higher numbers (17% versus 5%) of successful weight loss (Pedersen, Kang, & Kline, 2007).

Other evidence of System 1 thinking is found in studies on decision making, which show that people prefer going for the status quo option. When the default option is changed, we see that more people stay on this option out of convenience. For example, successfully changing the default option has led to an increase in organ donation registrations (Thaler & Sunstein, 2008). Promoting healthy food by making use of a default option has been tried as well. In a field experiment where the healthy option was displayed at the front of a restaurant menu, making it the default option, resulted in lower caloric intake (Downs, Loewenstein, & Wisdom, 2009). On the other hand, changing the default from french fries to ‘apple fries’ in an elementary school cafeteria did not have any effect on the french fries preferences of elementary school children (Just & Wansink, 2009). Therefore, using the default option as a behavioural nudge tends to work best when people do not have strong prior preferences.

The concept of bounded willpower means that people do not make the best long-term decision for themselves (Thorgeirsson & Kawachi, 2013), which is in line with present-biased preferences, where people attach more value to immediate gratification than to a better long-term decision. Both are a consequence of limited self-control. Feedback is a way of making people more aware of their choices and therefore a way to counter bounded willpower. It has shown to increase healthy behaviour, as a trial has shown that giving daily feedback on participation in a diet contributes to commitment to the dieting and to losing weight (Burke, et al., 2012).

The fact that people are better able to identify healthier products using traffic light colours instead of nutritional lists of grams and percentages strongly suggests that they rely more on

System 1 when making these kinds of choices. Although we would like people to think about their food choices correctly and carefully, it appears that it takes (too) much for this to happen. Therefore, all the previous examples show that it is a better idea to look at rapid System 1 thinking, and how we can use this to control present biased preferences and improve food decision making. The remainder of this literature review will therefore zoom in on food labelling, the associations that people have and the choices that are made as a result.

2.3 Labelling

In four studies, researchers find that the less healthy the product is portrayed, the more it is perceived as tasty, enjoyed during consumption, and preferred in the future (Raghunathan, Naylor, & Hoyer, 2006). From this we can draw the important conclusion that people associate unhealthiness with taste. The researchers found these results among people who said they do not like healthy food in general, and to a lesser extent among people who said they did not see any relations between healthiness and taste. It is with all sorts of products and activities that the healthiest, wisest, good-for-you choice is often not the most exciting, fun, or enjoyable option. This is in line with a more general unwholesome = fun relation (Raghunathan, Naylor, & Hoyer, 2006). Besides the fact that people perceive healthy food less tasty, they also find it less filling. Research shows that people have a strong belief that healthy food is less filling than unhealthy food, an effect labelled as healthy = less filling. Furthermore, they also find that when an emphasis is placed on the filling aspect, the belief that healthy foods fill less is mitigated (Suher, Raghunathan, & Hoyer, 2016).

The description of a product determines the overall experience. In an experiment, participants in both groups drank the same 380-calorie milkshake, but it was described as an indulgent high-calorie milkshake for one group and as healthy low-calorie for the other. The experiment showed that, after the participants consumed the milkshake, they would also experience and describe it in the same way that it was presented to them. The health-focused description of the milkshake was associated with lower satisfying experience after consumption. Less psychological satiation makes it less likely that a preference for this type of food will be developed (Crum, Corbin, Brownell, & Salovey, 2011). These negative effects are strengthened by evidence of less rewarding neural responses (Grabenhorst, Schulte, Maderwald, & Brand, 2013). As a result, it can be suggested that during a point-of-purchase decision, often made by System 1, no subconscious link is made to a healthy option when the option is described in a healthy way.

Research by Aggarwal et al. (2016) focuses on the four most important factors in food choices: taste, nutrition, cost, and convenience. It was found that over the years, taste has been the most frequently mentioned 'very important' factor in food choices by US adults, above the other three factors. This underlines that health-focused labelling is not the behavioural trigger we need to make people choose healthy meals. Still, nutritional labelling is one of the biggest interventions in influencing food choices in recent years. As a result, many large restaurants have started to behave more conscious about the how they present the products they serve to their consumers. Restaurants started to include products that are 'low-calorie' or menus that are the 'healthy-choice'. Evidence has been found that these healthy options on menus are significantly fewer described with exciting, fun, American-traditional, spicy, hot, tasty, provocative, or indulgent words than standard menu items are (Turnwald, Jurafsky, Conner, & Crum, 2017).

Taste-focused labelling has the potential to associate healthy eating with the most important factor in food choice: taste. By shifting the focus of promoting healthy food to taste, satisfaction and pleasure, expected and actual taste can increase. (Liem, Toraman Aydin, & Zandstra, 2012) (Raghunathan, Naylor, & Hoyer, 2006). If the expected and actual taste is better, people will develop a preference for healthier dishes and choose them sooner in the future.

In three field studies across dining settings in California, Turnwald et al. (2019) researched the effect of taste-focused labelling on healthy food consumption. The first study was done in a university cafeteria, where a vegetarian dish to students was presented. One day they were labelled healthy (eg., *Fiber-packed vegetables with nutritious miso sauce*) and verbally explained as healthy and nutritious, and on the other day the focus was shifted to taste (e.g., *Crispy veggie straws with decadent miso dip*) and verbally explained as tasty and delicious. The results showed that significantly more people (33.11%) chose the dish when it was described as tasty than when it was described as healthy (22.27%). A second study was conducted at a lunch buffet, where two of the five (vegetarian) dishes were labelled as healthy. These two were described in one buffet row with a healthy label and in the other buffet row with a tasty label. The result was that significantly more people chose the taste-focused labelled healthy dishes than the health-focused labelled healthy dishes. The third study looked at the effect of the description of vegetables on perceived taste and on the overall relationship between taste and health. Green beans were labelled healthy one day

(*Light 'n low carb Green Beans and Shallots*) and tasty the next day (*Sweet Sizzlin' Green Beans and Crispy Shallots*). During the meal, guests were asked to score the dishes on both for healthiness, taste, and indulgence. Then they were also asked their perception of the overall relationship between taste and health. The study found that taste-focused labelled meals were rated higher on tastiness and indulgence, and not on healthiness. Further, the diners that had taste-focused labelled meals more often endorsed the mindset that healthy foods are delicious.

2.4 Hypotheses

Considering the evidence of the previous studies by Turnwald et. al (2019), we hypothesise that taste-focused labelling will cause more people to choose the healthy (vegetarian) option, compared to the healthy options that are neutral labelled and health-focused labelled. Therefore:

H1: "The number of vegetarian dishes chosen will be higher if they are labelled taste focused."

Further, on the expectation of taste (sRQ2), we look to the previously discussed studies of Raghunathan et al. (2006) and Liem et al. (2012). From these, we hypothesize that the taste-focused labelling of healthy options will lead to a better expected taste than the neutral and healthy described healthy options. Furthermore, we expect that health-focused labelling will lead to a poorer perceived taste than neutral and taste-focused labelling.

H2: "The expected taste of the vegetarian dishes will be better when they are labelled taste-focused."
H3: "The expected taste of the vegetarian dishes will be worse when they are labelled health-focused."

Furthermore, in this study we look at whether different descriptions also result in a different expected healthiness of a dish. The hypothesis regarding this sub-research question (sRQ3) is related to the literature reviewed earlier. Turnwald and Crum (2019) revealed that taste-focused labelled dishes were perceived less healthy, compared to health-focused labelled dishes. This is in line with unhealthy = tasteful relationship of Raghunathan et al. (2006).

H4: "The expected healthiness of the vegetarian dishes will be lower when they are labelled taste-focused."
H5: The expected healthiness of vegetarian dishes will be higher when they are labelled health-focused."

Finally, an important subject of this research is the general relation between taste and health (sRQ4). In Turnwald and Crum (2019) evidence is found that people in a taste-focused labelled group were more likely to endorse the mindset that healthy foods taste delicious in general.

H6: "The general opinion about the relationship between healthiness and taste will be more positive when the vegetarian dishes are labelled taste-focused."

3. Experimental design

The causal relationship investigated is between taste-focused labelling and the number of healthy options chosen per participant. This study aims to examine the differences between taste-focused labelling, health-focused labelling, and neutral labelling. We investigate whether being part of the taste-focused treatment can increase or decrease the probability of choosing healthy options. For this reason, we have chosen to collect data by a between-subjects experimental quantitative study, by means of a Qualtrics survey. The complete survey is provided in Appendix A and the survey flow is provided in Appendix F.

3.1 Start and setup

The survey was suitable to be completed by anyone over the age of 18. To reach the widest possible audience, the language used in the entire experiment was English. The survey was distributed in my personal network, through social media and through online websites such as surveyswap.io and surveycircle.com. In addition, my acquaintances distributed it to their acquaintances, known as snowball sampling. The survey consisted of 4 parts and 27 questions. After a basic introduction message, there were four questions to collect demographics of the respondents, where we chose gender, age, highest level of education and whether the respondents live in an urban or rural area. We chose these demographics so we could understand the participants' backgrounds and control for these factors.

3.2 Randomization into groups

After collecting this information, the respondents were randomly divided into three groups. A control group and two treatment groups. In each group, the participants were asked five separate times to make a choice from a menu of a different fictive restaurant. On each menu, there were two options with meat and a high number of calories (the unhealthy options) and one vegetarian option with a relatively low number of calories (the healthy option). Below the meals was a short description of the ingredients, as is usual on restaurant menu cards. The dishes, complete recipes and calorie counts are described in Appendix E. The participants were asked to imagine that they were in a restaurant and to choose a dish *("Which dish would you choose?"*). Since we wanted to see the effect of the descriptions, price was deliberately left out as a factor. For the meal situations we chose breakfast, lunch, appetizers, starters, and dinner. We deliberately left out the dessert option because it was difficult to find suitable standard dishes that include meat.

The participants were randomly divided into three groups: the control group, and the health-focused and taste-focused treatment groups. In the control group, the healthy option was described as basic as possible (e.g., *black beans burger*). In the health-focused treatment group everything was the same, only the healthy option was described in a health-focused way (e.g., *healthy low-fat beans burger*). In the taste-focused treatment group everything was the same, only the healthy option was described in a taste-focused way (e.g., *homestyle crispy beans burger*). The unhealthy options were relatively standard alternatives for each type of meal, which reasonably could have appeared on a restaurant menu. We explicitly kept all descriptions and positioning of the unhealthy options the same over all three groups. For each choice of meal, the position of the healthy option was randomly determined. Examples of a choice is provided in Appendix B and all menus presented to the participants are displayed in Appendix D. The words chosen came from previous academic research. For the health-focused treatment group, the words were chosen from Turnwald (2017). This study showed that these words and types of descriptions appeared more often in health-focused menus (e.g., *light, healthy, nutritious,* or *low-fat*). For the taste-focused treatment group, the words from the same study were chosen, but specifically the words that appeared more often in the standard menus (e.g., *delicious, flavourful, sweet,* or *crispy*). We tried to emphasise taste, as this is the most important factor when people make food choices (Aggarwal, Rehm, Monsivais, & Drewnowski, 2016), but other indulgent words (e.g., *traditional, homestyle*) were used to enhance the expected taste as well.

3.3 Additional questions

After the participants had made meal choices in the five restaurant situations, they came to the next section of the survey. Here, just the five healthy options from the menus were presented separately again. Under each option was a statement about expected taste (*"I expect this dish to taste good"*), healthiness (*"I believe this dish is healthy"*). The participants were asked to give their opinion on the respective statement on a 5-point Likert Scale (Strongly disagree - Strongly agree). An example question is provided in Appendix C. This information was deliberately requested so that we could examine the effect of the different descriptions on the above-mentioned factors.

It was explicitly decided to let the participants choose from the menus first and only then to ask them their opinions separately about the vegetarian options of the menus. If we had done

this the other way round, the participants could have guessed what the experiment was about and participants would have been biased, as they would have seen an option that was 'familiar' to them suddenly appear on a menu.

3.4 Final questions

After this, all participants from the different groups went to the same last four questions again. First, the participant was asked how he/she views the relationship between healthy foods and taste (*"I believe that healthy food, in general, tastes good"),* which is in line with Turnwald (2017). The participant to give their opinion on the statement on a 5-point Likert Scale. Then, the respondent was asked whether he/she follows a (meat excluding) diet because we want to exclude these respondents from our sample, since they have clear reasons to choose the vegetarian option above the other two options. Third, the participant was asked whether he/she is currently trying to lose weight, since we do need to check for this factor, as it is expected to have an impact on the choice. The diet and weight-loss questions were deliberately asked at the end of the survey, because if we had done this at the beginning, people might have guessed that a healthy and/or vegetarian choice was important in their answers. Finally, the participant was asked when he/she last ate. We believe that this could influence expected taste. The complete flow of the survey is displayed in Appendix F.

4. Data

4.1 Descriptive data

In total, there were 196 complete responses to the survey. There were some incomplete responses, where people did not fill in a large part of the survey. After removing these, 184 answers complete answers remained. This data was exported from Qualtrics, and then imported into STATA 17. People who follow a vegetarian, vegan or other meat-excluding diet will always choose the vegetarian (healthy) option, no matter the type of labelling. Therefore, we have excluded this group from our sample. 20 respondents indicated this, so the sample size was reduced from 184 to 164. Several descriptive statistics were performed, so that we can show a clear overview of the sample. In Table 1 and these are clearly displayed. A few notable features: a large part of the sample is aged between 18-30 (47%), lives in an urban area (70%) and has at least a bachelor's degree as highest obtained education (82%). The differences in numbers of participants in the control, health-focused and taste-focused groups are consequences of deleting respondents, for reasons mentioned earlier.

Table 1 – Descriptive statistics per treatment

Demographic variable	**Treatment**			**Total**	
	Control	Health-focused	Taste-focused	Frequency	Percentage
Age					
18-30	23	32	22	77	46.95
31-40	2	4	4	10	6.10
41-50	6	1	4	11	6.71
51-60	15	14	14	43	26.22
61 or above	8	6	9	23	14.02
Total	54	57	53	164	100
Gender					
Male	25	27	22	74	45.12
Female	29	30	31	90	54.88
Total	54	57	53	164	100
Education					
High school	8	15	6	29	17.68
Bachelor’s degree	18	20	19	57	34.76
Master’s degree	25	20	21	66	40.24
Ph.D. or higher	3	2	7	12	7.32
Total	54	57	53	164	100
Living area					
Urban	39	36	39	114	69.51
Rural	15	21	14	50	30.49
Total	54	57	53	164	100

4.2 Methodology

The goal of this thesis is to find out what effect the descriptions have on the consumption of healthy foods (H1). To test this, we set up the following model. Per course (e.g., breakfast, lunch), each participant can score one point if he or she picks the healthy option from the menu. By adding up all the points per course, each participant ends up with a total number of chosen healthy dishes: the health score. Suppose the respondent chooses the healthy option from the breakfast, lunch, and dinner menu, then this respondent has a health score of 3. Thus, the health score per individual can take values from 0 to 5. By comparing the health scores, we were able to examine the effect of the different treatment groups (independent variable) on the health score (dependent variable).

First, we performed a Kruskal-Wallis H test to test whether the medians of the control, health-focused and taste-focused groups were equal. All assumptions for the Kruskal-Wallis test were met: (1) our independent and dependent variable were measured at the ordinal or continuous scale, (2) our independent variable consisted of two or more categorical groups and (3) there was independence of observations, since the participants were randomly divided into one of the three groups (Laerd Statistics, 2022). Next, we performed an ordered logistic regression to look at the sign and significance of the effect and then we obtained the average margins for the effect size. The dependent variable was the health score, the independent variable was the treatment group, and we controlled for age, gender, education, living area, whether the respondent was trying to lose weight, the general mindset on health and taste and the last time since a meal. The assumptions for the ordered logistic regression were all met: (1) the dependent variable is categorical, (2) the independent variables were either continuous, categorical, or ordinal, (3) no multi-collinearity and (4) there were proportional odds (Laerd Statistics, 2022).

Another part of the first hypothesis is to look at the differences per course, i.e., whether, for example, people are more likely to choose a taste-described healthy option at breakfast than at lunch. Thus, we have a dummy score per course, 1 for when a healthy option was chosen and 0 for when a participant chose an unhealthy option. We ran a logistic regression per course and obtained the average margins. The dependent variable was the dummy healthy decision variable, the independent variable was the treatment group, and we controlled for age, gender, education, living area, whether the respondent was trying to lose weight, the general mindset on health and taste and the last time the respondent had a meal. The assumptions for the

logistic regressions were met: (1) the dependent variable consisted of two categorical independent groups, (2) the independent variables were continuous or nominal, (3) there was independence of observations, (4) there was no multi-collinearity, (5) there was a linear relationship between any continuous independent variables and the logit transformation of the dependent variable, (6) there were no outliers ((Laerd Statistics, 2022).

For the hypotheses H2-H5, where we investigated the effect of labelling on expected taste and expected healthiness, the scores were generated and created in a different way. After picking dishes each course from the menu, now only the healthy options per course were shown to the respondents again (the additional questions). Here the respondents were asked, among other things, to give their opinion on the statements *"I expect this dish to taste good"* and *"I believe this dish is healthy"* on a 5-point Likert scale ranging from Strongly Disagree to Strongly Agree. When a respondent gave the answer Strongly Disagree, then he/she got a score of 1, when a respondent gave Somewhat Disagree then a score of 2 and so on until 5 points for Strongly Agree. For each healthy dish, every participant had a score from 1 to 5, and these scores added up to form the expected taste and expected healthiness score. Theoretically, since there were 5 healthy dishes where an opinion was asked, the scores could have values from 5 to 25. For expected taste, the average was 19.01, the lowest score 9 and the highest score 25 and for expected healthiness the average was 20.11, the lowest score 14 and the highest score 25. With these newly generated variables, we ran an Ordinary Least Squares (OLS) regression to examine the coefficients of the treatment groups. The dependent variable was the expected taste/healthiness score, the independent variable was the treatment group, and we controlled for age, gender, education, living area, whether the respondent was trying to lose weight, the participants general opinion on health and taste and for the last time since the respondent had a meal. The assumptions for an OLS regression were met: (1) the dependent variable was measured at the continuous level, (2) the independent variable is measured at the continuous or categorical level, (3) there was independence of observations, (4) there was no multi-collinearity, (5) there was homoskedasticity, (6) there were no significant outliers and (7) there was a linear relationship between de dependent and independent variables (Laerd Statistics, 2022).

For the last hypothesis (H6), where we looked at the relationship between a tasty description and the general opinion on the relationship between taste and health, the statistical analysis was relatively straightforward. One of the later additional questions to the respondents was to

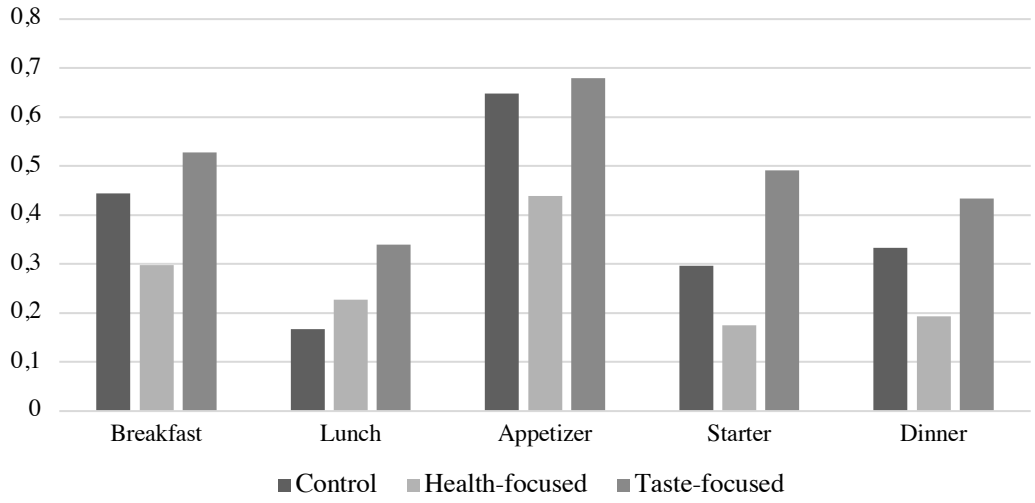
give their opinion on the statement *"I believe that healthy foods, in general, taste good"* on a 5-point Likert scale, which ranged from Strongly Disagree to Strongly Agree. Every respondent gave an answer to this question. With these data, we ran an ordered logistic regression and obtained the average margins. The dependent variable was the general opinion on health and taste variable, the independent variable was the treatment group, and we controlled for age, gender, education, living area, whether the respondent was trying to lose weight and the last time since the respondent had a meal. The previously mentioned assumptions for a Kruskal Wallis (Laerd Statistics, 2022) and ordered logistic regression were met here as well (Laerd Statistics, 2022). We classified an effect as statistically significant when the p-value is below 0.05, i.e., a significance level of $\alpha = 0.05$ and we will describe an effect as marginally significant when the p-value is below 0.10, i.e., a significance level of $\alpha = 0.10$.

5. Results

The statistical results will be dealt with separately for the hypotheses. Additionally, we describe other variable factors that have had an impact. In the regressions, we used the same base categories for the use of the control variables since these control variables were all categorical. The demographic control variables are provided in Table 1 and the base categories are provided in the note beneath the tables. For the variable general opinion, the base category used was "Neither agree nor disagree" on the statement *"I believe that healthy foods, in general, taste good"* where respondents were asked to answer on a 5-point Likert scale, which ranged from Strongly Disagree to Strongly Agree. For the variable losing weight, the base category used was "No" on the question *"Are you currently trying to lose weight?"*. For the variable time since meal, the base category was "Less than 1 hour ago" on the question "*When did you last eat a meal?".*

5.1 Results H1

Figure 1 – Healthy meal choice (dummy) average scores per group (H1)



In the first hypothesis, we test whether people chose more vegetarian dishes when the dishes were labelled taste focused. We will do this by looking at the health score, and separately at the dummies per course. The taste-focused treatment group shows a higher mean for each separate course, when looking at the healthy meal choice dummy variable, from which the health score is constructed. These results are illustrated at Figure 1.

The mean overall health score was 1.88 (SE=0.181) for the control group, 1.33 (SE=0.178) for the health-focused treatment group and 2.47 (SE=0.182) for the taste-focused treatment

group. This shows a higher average health score for the taste-focused treatment group. A Kruskal-Wallis H test was conducted to determine if consumption of healthy dishes (i.e., the health score) was different for three groups where the dishes were labelled: (1) basic (n = 54); (2) health-focused (n = 57); and (3) taste-focused (n = 53). A Kruskal-Wallis H test showed that there was a statistically significant difference in the health score between the three groups [$\chi 2(2) = 18.985$, $p = 0.0001$].

To test for H1, an ordered logistic regression has been conducted, of which the results are shown in Table 2. The likelihood ratio shows that the model is significant as a whole at $\alpha=0.01$ [$\chi 2$ (16, N = 164) = 87.87, $p = 0.000$]. For the independent variable (treatment) the control group – where the healthy dishes were labelled basic – was the base category. The model shows that the taste-focused treatment group has a significant positive effect on the number of healthy dishes chosen ($p = 0.046$). The model shows that health-focused labelling has a significant negative effect ($p = 0.017$) on the number of healthy dishes chosen. When we look at the average margins in Table 3, we can see that the positive effect of tasteful labelling is understated. When you are in the taste-focused group it increases your chances of having a health score of 3, 4 or 5 and it results in a significantly lower probability of choosing 0 healthy options ($p = 0.016$). Thus, taste-focused labelling has a positive influence on scoring a higher health score and a negative effect on scoring a low health score. However, we should mention that the positive average marginal effects of the taste-focused group have varying marginal statistical significance. The results, in general, are in line with hypothesis 1.

We see some notable effects of the control variables on the health score. For the age variable, we observe that participants in the age category 51-60 have a significantly higher health score ($p = 0.007$) than participants in the age category 18-31. For the gender variable, we see that men choose a significantly lower number of vegetarian dishes ($p = 0.016$). We also see that people who "somewhat" or "strongly" agree with the statement *"I believe that healthy food, in general, tastes good"* have a significantly higher health score ($p = 0.003$ and $p = 0.000$) than people who chose "neither agree nor disagree" Another result worth mentioning is that there is no significant effect on the health score of respondents who indicate that they are currently trying to lose weight.

Table 2 – Ordered Logistic Regression – Health score (H1)

Health score[a]	Coefficient	SE[b]	z	P>|z|	[95% Confidence Interval]	
Treatment[c]						
Health-focused	**-.889***	.372	-2.39	**0.017**	-1.617	-.160
Taste-focused	**.757***	.380	1.99	**0.046**	.012	1.501
Age[d]						
31-40	1.174	.718	1.64	0.102	-.232	2.580
41-50	1.005	.648	1.55	0.121	-.265	2.204
51-60	**1.177****	.437	2.69	**0.007**	.320	2.034
61-older	.758	.568	1.33	0.182	-.356	1.872
Gender[e]						
Male	**-.814***	.338	-2.41	**0.016**	-1.477	-.151
Education[f]						
Bachelor's degree	-.270	.445	-0.61	0.544	-1.143	.602
Master's degree	-.061	.470	-0.13	0.896	-.982	.860
Ph.D. or higher	-1.032	.769	-1.34	0.180	-2.539	.476
Living area[g]						
Urban	-.220	.356	-0.62	0.536	-.919	.478
Losing weight[h]						
Yes	-.259	.362	-0.72	0.474	-.968	.450
General opinion[i]						
Strongly disagree	-.482	1.609	-0.30	0.765	-3.636	2.672
Somewhat disagree	-.150	.543	-0.28	0.782	-1.215	.915
Somewhat agree	**1.249****	.413	3.02	**0.003**	.439	2.059
Strongly agree	**1.995****	.516	3.86	**0.000**	0.982	3.006
Time since meal[j]						
Between 1-4 hours ago	.223	.389	0.58	0.565	-.538	.985
More than 4 hours ago	.776	.529	1.47	0.143	-.262	1.813
Observations	164					
LR $\chi 2$ (16)	87.87					
Prob > $\chi 2$	0.000					
Pseudo R^2	0.1624					
Log likelihood	-226.610					

Note. [a] Dependent variable. [b] SE = Standard error. [c] Control group as base condition. [d] 18-30 years old as base condition. [e] Female as base condition. [f] High school as base condition. [g] Rural as base condition. [h] Not trying to lose weight as base condition. [I] Neither agree nor disagree as base condition. [j] Less than 1 hour as base condition. ** significant at significance level α=0.01. * significant at significance level α=0.05.

Table 3 – Margins of treatments on health score (H1)

Health-focused treatment group[a] **Health score[b]**	**dy/dx**	**SE[c]**	**z**	**P>|z|**	**[95% Confidence Interval]**	
0	**.133***	.055	2.41	**0.016**	.025	.241
1	.029	.015	1.90	0.058	-.001	.059
2	-.025	.014	-1,75	0.080	-.053	.003
3	**-.078***	.033	-2.33	**0.020**	-.143	-.012
4	**-.047***	.022	-2.15	**0.032**	-.090	.004
5	-.012	.008	1.50	0.134	-.028	.004

Taste-focused treatment group[d] Health score	dy/dx	SE	z	P>|z|	[95% Confidence Interval]	
0	**-.083***	.042	-1.98	**0.047**	-.164	.001
1	-.044	.024	-1.84	0.066	-.091	.003
2	-.009	.010	-0.86	0.389	-.028	.011
3	.055	.030	1.79	0.073	-.005	.114
4	.059	.031	1.88	0.060	-.002	.121
5	.022	.014	1.54	0.124	-.006	.049

Note. [a] Control group as base condition. [b] Health score can take values from 0-5. [c] SE = Standard error. [d] Control group as base condition. ** significant at significance level α=0.01. * significant at significance level α=0.05.

Since the healthy meal choice per course is a dummy variable, we performed a binary logistic regression per course and obtained the average marginal effects of the treatment groups per course of which the results are shown in Table 4. For the starter course, we observe a significant positive effect (p = 0.049) of taste-focused labelling. Further, we see that for the lunch course, labelling the healthy dishes taste-focused provide a marginally significant increase in the probability of consumption. For the other dishes (breakfast, appetizer, and dinner), we observe a positive effect of the taste-focused labelling of the healthy dishes on consumption, but this effect is not statistically significant different from 0. For health-focused labelling, we observe a significant negative effect (p = 0.009) on the healthy meal choice at the appetizer course. Moreover, we observe marginally significant negative effects of health-focused labelling for the breakfast and starter course.

Table 4 – Margins of treatment on healthy meal choice (H1)

Healthy meal choice[a]		dy/dx	SE[b]	z	P>|z|	[95% Confidence Interval]	
Course	**Treatment[c]**						
Breakfast	Health-focused	-.147	.082	-1.80	0.072	-.307	.013
	Taste-focused	.055	.085	0.65	0.514	-.111	.221
Lunch	Health-focused	.058	.076	0.76	0.446	-.091	.208
	Taste-focused	.137	.082	1.67	0.096	-.024	.299
Appetizer	Health-focused	**-.213****	.082	-2.60	**0.009**	-.373	-.052
	Taste-focused	.007	.084	0.08	0.935	-.158	.171
Starter	Health-focused	-.136	.080	-1.71	0.088	-.292	.020
	Taste-focused	**.185***	.094	1.97	**0.049**	-.001	.369
Dinner	Health-focused	-.098	.080	-1.22	0.223	-.255	.059
	Taste-focused	.051	.083	0.61	0.550	-.111	.213

Note. [a] Healthy meal choice is a dummy variable. [b] SE = Standard error. [c] Control group as base. ** significant at significance level α=0.01. * significant at significance level α=0.05.

5.2 Results H2 and H3

In the second and third hypotheses, we look at the most important component in a food choice: expected taste. We hypothesised that the taste-focused labelling of dishes has a positive impact, and that health-focused labelling has a negative impact on the expected taste score.

The mean expected taste score was 19.28 (SE=0.401) for the control group, 17.61 (SE=0.562) for the health-focused treatment group and 20.25 (SE=0.403) for the taste-focused treatment group. This shows a higher average expected taste score for the taste-focused treatment group, and relatively lower expected taste score for the health-focused treatment group. A Kruskal-Wallis H test was conducted to determine if expected taste of healthy dishes (i.e., the expected taste score) was different for three groups where the dishes were labelled: (1) basic (n = 54); (2) health-focused (n = 57); and (3) taste-focused (n = 53). A Kruskal-Wallis H test showed that there was a statistically significant difference in the expected taste score between the three groups [$\chi 2(2) = 12.541$, $p = 0.0019$].

To test for the second and third hypothesis, we ran an OLS-regression of which the results are shown at Table 5. The analysis with the expected taste-score as dependent variable, and the treatment as independent variable (with control group as base) reveals that labelling healthy dishes taste-focused has a positive effect on the expected taste ($\beta = 0.200$). However, this effect is statistically not significantly different from 0 ($p = 0.684$). Therefore, we reject hypothesis 2. Further, the analysis reveals that labelling vegetarian dishes health-focused has a statistically significant negative effect on the expected taste score ($\beta = 1.455$, $p = 0.006$). These results are in line with hypothesis 3.

Also, we see some remarkable effects of the control variables on the expected taste score. First of all, we see that for the age variable, being a in the age category 51-60 has a significant positive effect on the expected taste score ($\beta = 2.261$, $p = 0.001$). compared to participants aged 18-31. Furthermore, we observe for the gender variable that being male has a significant negative effect on the expected taste score ($\beta = -1.194$, $p = 0.017$). For the general opinion variable, we see a significant negative effect on the expected taste score of the people who "strongly" and "somewhat" disagree ($\beta = -3.806$, $p = 0.000$ and $\beta = -2.014$, $p = 0.008$) with the earlier described statement, and a significant positive effect on the expected taste score of the people who "somewhat" or "strongly" agree ($\beta = 1.571$, $p = 0.002$ and $\beta = 3.767$, $p =$

0.000). In all cases, these effects were compared to the people who chose "neither agree nor disagree" on the statement. For the variable time since last meal, we see that when the last meal was longer than four hours ago, this has a positive effect on the expected taste score (β = 1.330, p = 0.049), compared to people who indicated that their last meal was less than one hour ago.

Table 5 – Ordinary Least Squares Regression – Expected taste score (H2 and H3)

Expected taste score[a]	**Coefficient**	**SE[b]**	**t**	**P>|t|**	**[95% Confidence Interval]**	
Treatment[c]						
Health-focused	**-1.445****	.523	-2.77	**0.006**	-2.478	-.412
Taste-focused	.200	.489	0.41	0.684	-.766	1.165
Age[d]						
31-40	.314	.779	0.40	0.687	-1.225	1.853
41-50	1.355	.802	1.69	0.093	-.231	2.941
51-60	**2.261****	.654	3.46	**0.001**	.969	3.554
61-older	1.090	.722	1.51	0.134	-.338	2.512
Gender[e]						
Male	**-1.194***	.493	-2.42	**0.017**	-2.169	-.220
Education[f]						
Bachelor's degree	-.896	.621	-1.44	0.151	-2.123	.331
Master's degree	-1.076	.708	-1.52	0.131	-2.475	.323
Ph.D. or higher	**-2.665***	1.095	-2.43	**0.016**	-4.830	-.500
Living area[g]						
Urban	-.073	.490	0.15	0.882	1.042	.896
Losing weight[h]						
Yes	.033	.520	0.06	0.949	-.995	1.062
General opinion[i]						
Strongly disagree	**-3.806****	.869	4.38	**0.000**	2.089	5.23
Somewhat disagree	**-2.014****	.745	-2.70	**0.008**	-3.489	-.542
Somewhat agree	**1.571****	.490	3.20	**0.002**	.602	2.540
Strongly agree	**3.767****	.661	5.70	**0.000**	2.461	5.073
Time since last meal[j]						
Between 1-4 hours	.521	.467	1.12	0.266	-.402	1.444
More than 4 hours	**1.330***	.670	1.98	**0.049**	.005	2.654
Constant	**18.41****	.932	19,76	**0.000**	16.567	20.251
Observations	164					
F	.					
Prob > F	.					
R^2	0.566					
Root MSE	2.513					

Note. [a] Dependent variable. [b] SE = Standard error. [c] Control group as base condition. [d] 18-30 years old as base condition. [e] Female as base condition. [f] High school as base condition. [g] Rural as base condition. [h] Not trying to lose weight as base condition. [i] Neither agree nor disagree as base condition. [j] Less than 1 hour ago as base condition. ** significant at significance level α=0.01. * significant at significance level α=0.05.

5.3 Results H4 and H5

In the fourth and fifth hypotheses, we look at another important component in food choice: expected healthiness. We hypothesised that the taste-focused labelling of food has a negative impact, and that the health-focused labelling has a positive impact on this score.

The mean expected healthiness score was 20.50 (SE=0.320) for the control group, 20.23 (SE=0.356) for the health-focused treatment group, and 19.58 (SE=0.366) for the taste-focused treatment group. This shows the highest average expected healthiness score for the control group, and relatively lower expected taste scores for the taste-focused and health-focused treatment groups. A Kruskal-Wallis H test was conducted to determine if the expected healthiness of healthy dishes (i.e., the expected healthiness score) was different for three groups where the dishes were labelled: (1) basic (n = 54); (2) health-focused (n = 57); and (3) taste-focused (n = 53). A Kruskal-Wallis H test showed that there was a no significant difference in the health score between the three groups [$\chi 2(2) = 3.476$, $p = 0.1759$].

Testing for the fourth and fifth hypotheses, we ran an OLS-regression with the expected healthiness score as the dependent variable. The regression, of which the results are shown in Table 6, reveals that labelling the healthy dishes taste-focused has a significant negative effect on the expected healthiness of the dish ($\beta = -1.201$, $p = 0.021$). This is in line with hypothesis 4. Further, the regression reveals that labelling healthy dishes health-focused has a negative effect ($\beta = 0.125$) on the expected healthiness score. This is the opposite effect of what was expected. However, this effect is statistically insignificant. With this information in mind, we reject H5.

When observing the control variables, we see that being in the age category 41-50 has a positive effect on the expected healthiness score ($\beta = 1.784$, $p = 0.010$), compared to respondents in the age category 18-31. For the education variable, we observe a negative effect of having a master's degree as highest obtained education on the expected healthiness score ($\beta = -1.384$, $p = 0.047$), compared to having high school as highest obtained education. Another effect we observe is a positive effect on the expected healthiness score ($\beta = 1.471$, $p = 0.025$) of people who choose "strongly agree" on the health taste statement, compared to people who chose "neither agree nor disagree".

Table 6 – Ordinary Least Squares Regression – Expected healthiness score (H4 and H5)

Expected healthiness score[a]	Coefficient	SE[b]	t	P>|t|	[95% Confidence Interval]	
Treatment[c]						
Health-focused	-.125	.496	-0.25	0.801	-1.106	.856
Taste-focused	**-1.201***	.515	2.33	**0.021**	-2.219	-.184
Age[d]						
31-40	0.001	.845	0.00	0.999	-1.669	1.671
41-50	**1.784****	.679	2.63	**0.010**	.441	3.127
51-60	.947	.651	1.46	0.148	-.339	2.234
61-older	.475	.716	0.66	0.508	-.941	1.890
Gender[e]						
Male	-.031	.440	-0.07	0.943	-.901	.838
Education[f]						
Bachelor's degree	-.767	.641	-1.20	0.234	-2.033	.500
Master's degree	**-1.384***	.691	-2.00	**0.047**	-2.751	-.016
Ph.D. or higher	-1.001	1.022	-.98	0.329	-3.020	1.020
Living area[g]						
Urban	-.105	.476	-0.22	0.825	-1.045	.835
Losing weight[h]						
Yes	.193	.551	0.35	0.727	-.896	1.281
General opinion						
Strongly disagree	-.005	.869	-0.01	0.995	-1.723	1.712
Somewhat disagree	-.914	.683	-1.34	0.182	-2.265	.434
Somewhat agree	.061	.499	0.12	0.903	-.926	1.048
Strongly agree	**1.471***	.650	2.26	**0.025**	.184	2.757
Time since meal						
Between 1-4 hours ago	0.050	.461	0.11	0.961	-0.861	.962
More than 4 hours ago	-0.038	.780	-0.05	0.913	-1.580	1.503
Constant	**20.835****	.884	23.57	**0.000**	19.088	22.58
Observations	164					
F (15, 146)	.					
Prob > F	.					
R^2	0.1617					
Root MSE	2.5028					

Note. [a] Dependent variable. [b] SE = Standard error. [c] Control group as base condition. [d] 18-30 years old as base condition. [e] Female as base condition. [f] High school as base condition. [g] Rural as base condition. [h] Not trying to lose weight as base condition. [i] Neither agree nor disagree as base condition. ** significant at significance level α=0.01. * significant at significance level α=0.05.

5.4 Results H6

In the sixth hypothesis, we look at another component in food choice: the general opinion about the taste of healthy food. Based on previous literature, we hypothesised that the taste-focused labelling of dishes would have a positive impact on this opinion. We measured the opinion by asking respondents their opinion on the statement *"I believe that healthy food, in general, tastes good",* where they provided their answer on a 5-point Likert scale ranging from Strongly Disagree to Strongly Agree.

A Kruskal-Wallis H test was conducted to determine if the general opinion on the relationship between taste and health (i.e., general opinion) was different for three groups where the dishes were labelled: (1) basic (n = 54); (2) health-focused (n = 57); and (3) taste-focused (n = 53). The Kruskal-Wallis H test showed that there was no statistically significant difference in the general opinion between the three groups [$\chi 2(2) = 4.427$, $p = 0.1093$]. Furthermore, to investigate this relationship, we ran the Ordered Logistic Regression of which the results are being shown in Table 7. This showed a small positive effect of taste-focused labelling of healthy dishes on the general health-taste relationship, which was marginally significant with a significance level of $\alpha=0.10$. Furthermore, when looking at the average margins in Table 8, we observe that being a participant in the taste-focused treatment group has a marginally significant positive impact on being in the agreeing categories.

Looking at the results of the Kruskal Wallis H test, the Ordered Logistic Regression, and the obtained average margins, we conclude that there is no sufficient statistical evidence to support H6, therefore we reject this hypothesis.

Among the control variables, we see some noteworthy results. We observe on the age variable that it has a positive effect on the overall opinion when a participant falls in the age category 41-50 ($p = 0.011$). Furthermore, we see that being male has a significant negative effect on agreeing with the statement ($p = 0.035$)

Table 7 – Ordered Logistic Regression – General opinion (H6)

General opinion[a]	Coefficient	SE[b]	z	P>|z|	[95% Confidence Interval]	
Treatment[c]						
Health-focused	-.081	.369	-0.22	0.827	-.805	.643
Taste-focused	.671	.377	1.78	0.075	-.068	1.411
Age[d]						
31-40	-.093	.660	-0.14	0.888	-1.386	1.200
41-50	.232	.637	0.36	0.715	-1.017	1.481
51-60	**1.165***	.457	2.55	**0.011**	.268	2.062
61-older	.420	.562	0.75	0.455	-.682	1.523
Gender[e]						
Male	**-.706***	.336	-2.10	**0.035**	-1.364	-.048
Education[f]						
Bachelor's degree	-.413	.442	-0.93	0.351	-1.280	.454
Master's degree	-.236	.481	-0.49	0.624	-1.178	.706
Ph.D. or higher	.233	.754	0.31	0.757	-1.244	1.710
Living area[g]						
Urban	-.009	.362	-0.02	0.981	-.718	.701
Losing weight[h]						
Yes	.432	.374	-1.15	0.249	-1.165	.302
Time since meal						
Between 1-4 hours ago	-0.137	.364	-0.04	0.970	-.727	.700
More than 4 hours ago	.527	.552	0.95	0.340	-.556	1.611
Observations	164					
LR $\chi 2$ (12)	28.98					
Prob > $\chi 2$	0.011					
Pseudo R^2	0.068					
Log likelihood	-199.032					

Note. [a] Dependent variable. [b] SE = Standard error. [c] Control group as base condition. [d] 18-30 years old as base condition. [e] Female as base condition. [f] High school as base condition. [g] Rural as base condition. [h] Not trying to lose weight as base condition. ** significant at significance level α=0.01. * significant at significance level α=0.05.

Table 8 – Margins of treatment on General opinion (H6)

Taste-focused treatment group[a] General opinion[b]	dy/dx	SE[c]	z	P>|z|	[95% Confidence Interval]	
Strongly disagree	-.003	.004	-0.87	0.382	-.011	.004
Somewhat disagree	-.065	.038	-1.72	0.085	-.139	.009
Neither agree nor disagree	-.064	.037	-1.75	0.080	-.135	.008
Somewhat agree	.034	.025	1.39	0.164	-.014	.083
Strongly agree	.098	.056	1.76	0.079	-.011	.207

Note. [a] Control group as base condition. [b] General opinion can take values from 1-5 on a Likert scale (Strongly disagree – Strongly agree). [c] SE = Standard error. *** significant at significance level α=0.01. ** significant at significance level α=0.01. * significant at significance level α=0.05.

6. Discussion

6.1 Research questions answered

The main research question (RQ1) of this thesis is whether people are more likely to choose vegetarian options when these are tastefully described. As expected, labelling healthy dishes taste-focused has a significant positive effect on the consumption of healthy dishes. The average health scores differ significantly from the control and health-focused treatment groups and the regression results show a positive impact of being in the taste-focused treatment group on the health scores. Also, we observe a significant negative effect on the number of healthy dishes chosen when these were labelled health focused. Furthermore, when we look at the courses separately, we observe that the effect of the taste-focused labelling is the strongest at the starter course.

To research the choices behind consumption, we investigated expected taste (sRQ1), as this is the most important component when people make food choices (Aggarwal, Rehm, Monsivais, & Drewnowski, 2016). We hypothesized a positive effect of taste-focused labelling, and a negative effect of health-focused labelling on the expected taste of a vegetarian dish. Differently than expected, the expected taste score is not significantly higher for vegetarian dishes that were labelled taste-focused compared to the vegetarian dishes that were labelled basic. This indicates that the expected taste of a vegetarian dish is not necessarily higher when the emphasis is placed on taste. This does not mean, however, that labelling should not be paid attention to at all, as we see a significant negative effect on expected taste when the vegetarian dishes are also explicitly described healthy. So, if the expected taste of a healthy dish is to be as high as possible, it is wise to avoid healthy descriptions.

Continuing our research for choices behind healthy food consumption, we investigated expected healthiness (sRQ2), as this is an important component when people make food choices. We hypothesized a negative effect of taste-focused labelling, and a positive effect of health-focused labelling on the expected healthiness. As expected, the expected healthiness score was significantly lower for participants that were in the taste-focused treatment group, compared to the control group. This implies that labelling healthy foods with an emphasis on taste, decreases expected healthiness of the meal. Previous literature has shown that when a dish is expected to be healthy, this has an inverse relationship with a positive experience (Raghunathan, Naylor, & Hoyer, 2006). Thus, if tasteful labelling contributes to less healthy

expectations, it may have a positive effect on the expected experience and final consumption of the vegetarian dish. Contrary to our expectations, we find that health-focused labelling has no significant effect on the expected healthiness of the dish, compared to the dishes that are basic labelled.

Finally, as last component of healthy meal choice, we researched the general mindset about taste and healthiness (sRQ3). Previous literature (Turnwald & Crum, 2019) found that taste-focused labelling had a positive impact on the general opinion on the taste-health relationship. Therefore, we hypothesized a positive effect of taste-focused labelling on this general opinion. Differently than expected, we did not find a statistical effect of labelling foods taste-focused and the general opinion on taste and healthiness. This implies that it is not effective to improve the general opinion on taste and health by tasteful labelling healthy dishes.

Other noteworthy results that emerged from the regressions is that men choose significantly fewer vegetarian options, score the expected taste of vegetarian dishes significantly lower and are significantly less positive about the general taste of healthy food. Therefore, it seems that men hold on more strongly to their meat preferences.

An overview of the hypotheses, and whether we have found statistical evidence for them, is provided in Table 9.

Table 9 – Overview Hypothesis testing

Hypothesis		**Treatment**	**Supported**
H1	Consumption	Taste-focused	Yes
H2	Expected taste	Taste-focused	No
H3	Expected taste	Health-focused	Yes
H4	Expected healthiness	Taste-focused	Yes
H5	Expected healthiness	Health-focused	No
H6	General opinion	Taste-focused	No

6.2 Limitations

This research has several limitations. The survey was spread among different personal channels and online media, but still the sample size is not a representation of the population. First, the results say something about higher educated persons, since most (82%) participants have at least a bachelor's degree. Second, the research did not explicitly ask about country of origin, but we can assume that, because it was mostly spread in my personal network, the vast majority have the Dutch nationality. Therefore, we acknowledge that these results mainly relate to higher educated Dutch people. Also, in the results we see that when a participant falls in the age category 51-60, this has a significant positive effect on the health score and a significant positive effect on the expected taste score, both in comparison with participants who fall in the base category 18-31. A possible cause of this strong significant effect is that the vast majority (79%) of the participants between 51-60 were women, and it also appears from the health score regression that women, compared to men, are more likely to choose vegetarian options. This makes the effect of the age category 51-60 seem stronger than it might be, and these strong effects on the scores are more likely to be an effect of gender. A suggestion for further research would therefore be to effectively distribute the survey to different education levels, proportionally across genders by age groups and a more international audience. This would increase the external validity of the results (Baron & Kenny, 1986).

Another limitation is that we considered the factors expected taste, expected healthiness and general opinion of taste and health as factors behind consumption. Price and convenience are also important factors (Raghunathan, Naylor, & Hoyer, 2006). Price was deliberately kept out of this study because we wanted to look explicitly at the effect of the tasteful labels, and we did not want people to choose one dish or another because of price. Convenience is another factor, but more important when people are choosing what kind of meal to make themselves (Raghunathan, 2006), and is less applicable in a restaurant setting.

Furthermore, two adjustments were made to the survey during the study. Firstly, as the original additional question, there was also a question about the likelihood of choosing in a restaurant, but this was duplicated in the main research question and therefore this question was left out of the research. Furthermore, there was also a 4th option *"I would choose not to pick a dish"* for the first 64 respondents in the menus. Seven participants chose this option in total. This option was later removed. This had no effect on the analysis, since per meal a

dummy score (1 for healthy choice and 0 for unhealthy choice) could be obtained. The seven participants who chose "I would choose not to pick a dish" simply scored 0.

In this study, we chose to build the health score from choices of 5 courses, and so everyone could have a health score of 0-5. The choice for the low number of total choices was made to keep the survey limited. We would have been able to say something about the effect with more precision if we had done more choices per course. For example, if we had chosen 3 menus per course, making a total of 15 choices, the effect might have been visible more precisely. Furthermore, some dishes are generally popular (bruschetta, appetizer) or unpopular (beans burger, lunch), which indicates that we should have chosen other healthy dishes or different unhealthy options.

Furthermore, literature shows that hypothetical choices can differ from real life decisions (Johannesson, Liljas, & Johansson, 1998) and we recognise that this study is about the results of hypothetical choices made by respondents. Choosing an option from an online imitation menu has different consequences than actually choosing a dish in a restaurant. Results from a field experiment could therefore provide more accurate insights into the effects of tasteful labelling on healthy food choices. We therefore would recommend this for future research.

In a follow-up study in the field, we would increase the number of options per course. Furthermore, we could then ask for actual taste and healthiness after consumers have eaten a tasty, healthy, or basic described healthy dish. This way, we would be able to see if this influences actual taste and healthiness.

7. Conclusion

Globally, people are eating more and more unhealthily, of which results can be seen in increasing obesity rates, higher social health costs and a growing impact of the food industry on the environment. This thesis recognised these problems and actively investigated a possible solution. One of the main reasons that people choose unhealthy foods is that it is directly associated with a tasty experience, and taste is the most important component when making a food choice. This thesis has investigated whether it is possible to apply this tasteful association to healthy food by explicitly labelling vegetarian food tasteful. We hypothesized that the number of vegetarian dishes chosen would be higher when we labelled them taste-focused, compared to labelling them basic or health-focused. We examined this by randomly assigning participants to groups and having them choose from menus where the healthy dishes were either (1) basic labelled, (2) healthy labelled or (3) tastefully labelled, among other unhealthy dishes. Results of an ordered logistic regression let us conclude that labelling vegetarian dishes tasteful results in a significant higher number of vegetarian dishes chosen, when compared to labelling them basic and health focused. Also, we observe a negative effect of health-focused labelling on the number of vegetarian dishes chosen.

Furthermore, we investigated three important factors behind food choice, and whether taste- and health-focused labelling has an influence on this. These factors were expected taste, expected healthiness and general opinion about the tastiness of healthy food. We measured the expected taste and healthiness by adding up scores that participants provided on the vegetarian options, and we registered the general opinion on taste and health by means of a Likert-scale question. For the expected taste score, we see no effect of taste-focused labelling, but we do see that health-focused labelling results in a lower expected taste of a dish. When we look at expected healthiness, we see that taste-focused labelling causes people to expect a dish to be less healthy. We see no effect on the expected healthiness of a dish through healthy labelling. Furthermore, we looked at the effects of the different labelling styles on the general opinion about the tastiness of healthy food. Here, we found no significant effects of tasty or healthy labelling.

Looking at the academic relevance of this thesis, we see that these results build on previous experiments. Whereas previous experiments often chose a particular course as a snapshot, this study has widened the scope by including five different courses in the experiment. For

instance, we see that the positive effect of taste-focused labelling is strongest with the starter, and the negative effect of health-focused labelling is strongest with the appetizer. Also, by looking at three important components behind a food choice, we have gained a better idea of how we can possibly influence this behaviour and associated choices.

When we look at social implications, we can learn from the results of this thesis. If we want to effectively combat the negative consequences of the consumption of unhealthy food, it is a good idea to examine the way we present healthy alternatives. The focus of the descriptions should not be on the healthiness of the food, as this results in a negative association and is therefore counterproductive. If we want to effectively make people choose healthy options, it is a better idea to focus the description of healthy dishes on the tasty and rewarding aspects of the dish. By encouraging restaurants to describe vegetarian options in a more tasteful way, governments and other institutions can achieve health, social and environmental gains in a simple and inexpensive way.

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9. Appendix

A. Survey full

<table>
<tr><td>Introduction</td><td>Hello,

Thank you for participating in this study. First, we would like to collect general data. Second, you will be asked to make choices in five situations and provide an opinion. Finally, there will be some additional questions. Please fill in the choices you would normally make.

The survey takes about 3 minutes to complete. All information and answers you provide are anonymous and treated confidentially. These will only be used for this research.

For any questions, please feel free to contact me. Thank you for your participation.

Tobias Hak
+31 6 57572279</td></tr>
<tr><td rowspan="4">Demographics</td><td>Age
What is your age?
○ 18-30
○ 31-40
○ 41-50
○ 51-60
○ 61 or above</td></tr>
<tr><td>Gender
What is your gender?
○ Male
○ Female
○ Non-binary / third gender
○ Prefer not to say</td></tr>
<tr><td>Education
What is your highest obtained education?
○ High School
○ Bachelor’s degree
○ Master’s degree
○ Ph.D. or higher
○ Prefer not to say</td></tr>
<tr><td>Living area
What kind of area do you live in?
○ Urban
○ Rural
○ Prefer not to say</td></tr>
<tr><td>Choices</td><td>Breakfast
Imagine you are at a restaurant having breakfast.
Which dish would you choose?
Control
○ Scrambled Eggs with Sausage and Cheese
○ Yoghurt Bowl
○ Waffles with Bacon and Maple Syrup
Health-focused
○ Scrambled Eggs with Sausage and Cheese
○ Healthy Yoghurt Bowl
Taste-focused
○ Scrambled Eggs with Sausage and Cheese
○ Delicious Yoghurt Bowl</td></tr>
</table>

		○ Waffles with Bacon and Maple Syrup	○ Waffles with Bacon and Maple Syrup
	Lunch Imagine you are at a restaurant to have lunch. Which dish would you choose?		
	Control ○ Black Beans Burger ○ Tuna Melt Sandwich ○ Philly Cheese Steak Sandwich	*Health-focused* ○ Healthy Low-Fat Beans Burger ○ Tuna Melt Sandwich ○ Philly Cheese Steak Sandwich	*Taste-focused* ○ Homestyle Crispy Beans Burger ○ Tuna Melt Sandwich ○ Philly Cheese Steak Sandwich
	Appetizer Imagine you are at a restaurant to eat some appetizers. Which dish would you choose?		
	Control ○ Bruschettas ○ Sauteed Chorizo ○ Fried Chicken Wings	*Health-focused* ○ Light and Simple Bruschettas ○ Sauteed Chorizo ○ Fried Chicken Wings	*Taste-focused* ○ Mouth Watering Bruschettas ○ Sauteed Chorizo ○ Fried Chicken Wings
	Starter Imagine you are at a restaurant and you are going to choose a starter. Which dish would you choose?		
	Control ○ Steak Tartare ○ Vitello Tonnato ○ Beet Carpaccio	*Health-focused* ○ Steak Tartare ○ Vitello Tonnato ○ Nutritious Beet Carpaccio	*Taste-focused* ○ Steak Tartare ○ Vitello Tonnato ○ Traditional Flavorful Beet Carpaccio
	Diner Imagine you are at a restaurant having dinner. Which dish would you choose?		
	Control ○ T-Bone Steak ○ Cheeseburger ○ Aubergine Stew	*Health-focused* ○ T-Bone Steak ○ Cheeseburger ○ Vegetarian Aubergine Stew	*Taste-focused* ○ T-Bone Steak ○ Cheeseburger ○ Incredibly good Aubergine Stew
Additional Questions	Please look at the options displayed and provide an opinion in terms of expected taste, healthiness and likelihood of choosing it in a restaurant.		
	Breakfast		
	Control Yoghurt Bowl	*Health-focused* Healthy Yoghurt Bowl	*Taste-focused* Delicious Yoghurt Bowl
	I expect this dish to taste good ○ Strongly Disagree ○ Somewhat Disagree ○ Neither agree nor disagree ○ Somewhat Agree ○ Strongly Agree		
	I believe this dish is healthy ○ Strongly Disagree ○ Somewhat Disagree ○ Neither agree nor disagree ○ Somewhat Agree ○ Strongly Agree		
	There is a good chance that I would order this in a restaurant ○ Strongly Disagree		

	○ Somewhat Disagree ○ Neither agree nor disagree ○ Somewhat Agree ○ Strongly Agree
	Lunch *Control* / *Health-focused* / *Taste-focused* Black Beans Burger / Healthy Low-Fat Beans Burger / Homestyle Crispy Beans Burger
	I expect this dish to taste good ○ Strongly Disagree ○ Somewhat Disagree ○ Neither agree nor disagree ○ Somewhat Agree ○ Strongly Agree
	I believe this dish is healthy ○ Strongly Disagree ○ Somewhat Disagree ○ Neither agree nor disagree ○ Somewhat Agree ○ Strongly Agree
	There is a good chance that I would order this in a restaurant ○ Strongly Disagree ○ Somewhat Disagree ○ Neither agree nor disagree ○ Somewhat Agree ○ Strongly Agree
	Appetizer *Control* / *Health-focused* / *Taste-focused* Bruschettas / Light and Simple Bruschettas / Mouth Watering Bruschettas
	I expect this dish to taste good ○ Strongly Disagree ○ Somewhat Disagree ○ Neither agree nor disagree ○ Somewhat Agree ○ Strongly Agree
	I believe this dish is healthy ○ Strongly Disagree ○ Somewhat Disagree ○ Neither agree nor disagree ○ Somewhat Agree ○ Strongly Agree
	There is a good chance that I would order this in a restaurant ○ Strongly Disagree ○ Somewhat Disagree ○ Neither agree nor disagree ○ Somewhat Agree ○ Strongly Agree
	Starter *Control* / *Taste-focused* / *Health-focused* Beet Carpaccio / Nutritious Beet Carpaccio / Traditional Flavorful Beet Carpaccio
	I expect this dish to taste good ○ Strongly Disagree ○ Somewhat Disagree

	○ Neither agree nor disagree ○ Somewhat Agree ○ Strongly Agree
	I believe this dish is healthy ○ Strongly Disagree ○ Somewhat Disagree ○ Neither agree nor disagree ○ Somewhat Agree ○ Strongly Agree
	There is a good chance that I would order this in a restaurant ○ Strongly Disagree ○ Somewhat Disagree ○ Neither agree nor disagree ○ Somewhat Agree ○ Strongly Agree
	Dinner *Control*: Aubergine stew *Taste-focused*: Vegetarian Aubergine Stew *Health-focused*: Incredibly Good Aubergine Stew
	I expect this dish to taste good ○ Strongly Disagree ○ Somewhat Disagree ○ Neither agree nor disagree ○ Somewhat Agree ○ Strongly Agree
	I believe this dish is healthy ○ Strongly Disagree ○ Somewhat Disagree ○ Neither agree nor disagree ○ Somewhat Agree ○ Strongly Agree
	There is a good chance that I would order this in a restaurant ○ Strongly Disagree ○ Somewhat Disagree ○ Neither agree nor disagree ○ Somewhat Agree ○ Strongly Agree
Final Questions	I believe that healthy food, in general, tastes good ○ Strongly Disagree ○ Somewhat Disagree ○ Neither agree nor disagree ○ Somewhat Agree ○ Strongly Agree
	Are you a vegetarian, vegan or on any diet that excludes meat? ○ Strongly Disagree ○ Somewhat Disagree ○ Neither agree nor disagree ○ Somewhat Agree ○ Strongly Agree
	Are you currently trying to lose weight? ○ Strongly Disagree ○ Somewhat Disagree ○ Neither agree nor disagree ○ Somewhat Agree ○ Strongly Agree
	When did you last eat a meal?

	○ Strongly Disagree ○ Somewhat Disagree ○ Neither agree nor disagree ○ Somewhat Agree ○ Strongly Agree
End	Thank you. Your answers have been recorded.

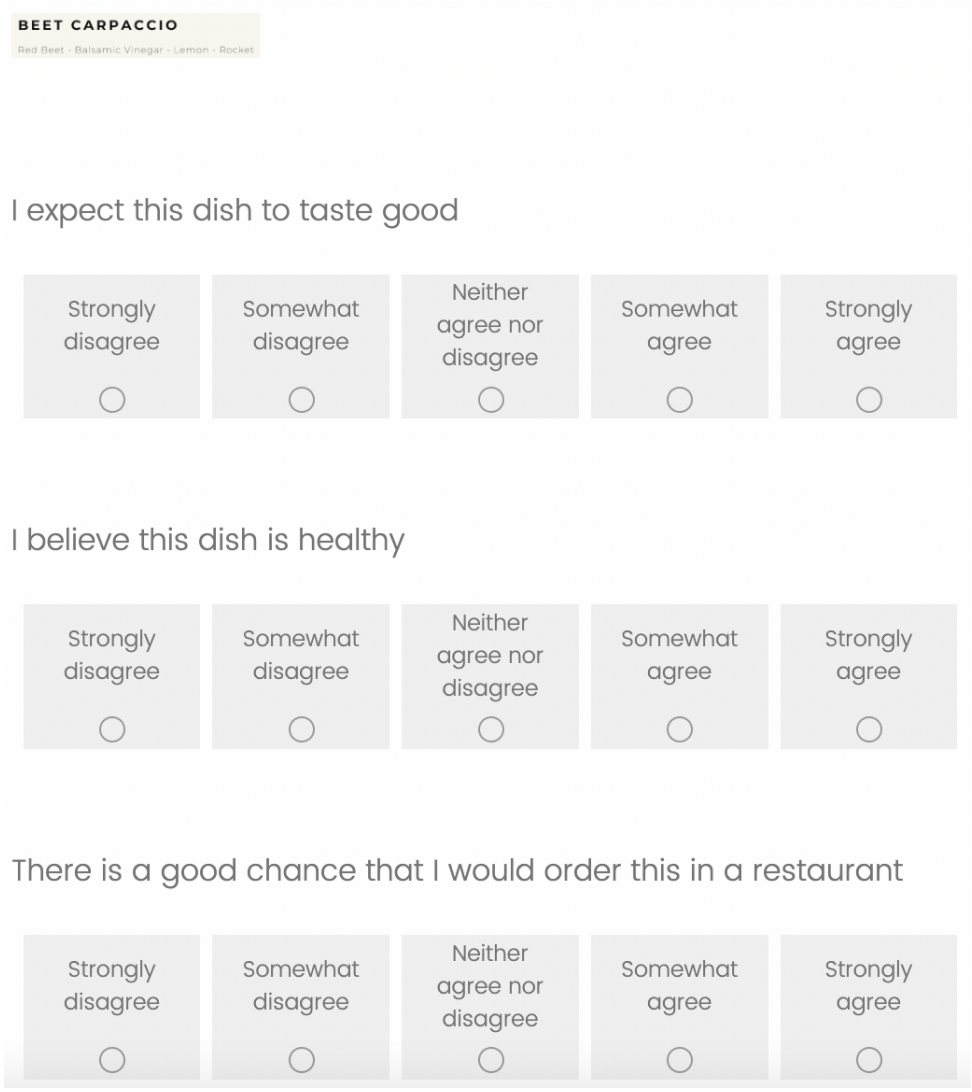
B. Example of menu choice moment – Breakfast, health-focused treatment

Imagine you are in a restaurant to have breakfast:

Which dish would you choose?

- (●) Scrambled Eggs with Sausage and Cheese
- ( ) Healthy Yoghurt Bowl
- ( ) Waffles with Bacon and Maple Syrup

C. Example of additional questions – Starter, control group



D. All menus presented, by randomized group

	Control	Health-focused treatment	Taste-focused treatment
Breakfast			
Lunch			
Appetizer			

Starter

Dinner

E. Dishes, ingredients, and estimated calories of all menu options

Breakfast	**Scrambled eggs with sausage and cheese**	**Yoghurt bowl**	**Waffles with bacon and maple syrup**
Ingredients	10 pork breakfast sausage, ¼ cup onion, diced, 7 eggs, ⅓ cup half and half, 1 ½ cups cheddar cheese, salt & pepper Servings: 4	1 cup Greek yoghurt, 1/4 cup blueberries, 1/2 cup raspberries, 1 cup cantaloupe, 1 tbsp. goji berries, 1 tbsp. pumpkin seeds, 1 tbsp. sliced, almonds, 1tbsp. coconut shavings, ½ cup granola Servings: 2	250g plain flour, 1 tbsp. baking powder, 1 tbsp. caster sugar, 3 eggs, 425ml milk, 100g butter, 20 rashers smoked streaky bacon, Maple syrup Servings: 6
Estimated calories per serving (kcal)	477	308	608
Lunch	**Tuna melt sandwich**	**Beans burger**	**Philly cheese steak sandwich**
Ingredients	1 c. mayonnaise, 1/2 lemon, 2 (6-oz.) cans tuna, 1 ribs celery, 2 dill pickles, 1/4 c. red onion, 2 tbsp. parsley,	1 can black beans, 1/4 cup dried, breadcrumbs, 1 large egg, beaten, 2 tbsp. dried onion flakes, 1 tbsp. Worcestershire sauce, 1/2	1 lb Ribeye steak, trimmed and thinly sliced*, salt, pepper, 1 onion, 8 slices provolone cheese, mild 4 Hoagie Rolls, 2 tbsp. butter,

	salt, pepper, 8 slices bread, 2 tbsp. butter, 1 tomato, 8 slices cheddar Serves: 4	tsp. pepper, 1 tbsp. canola oil, 4 hamburger buns, lettuce, tomato slices, pickle slices, Ketchup Serves: 4	1 garlic clove, 2-4 tbsp. mayonnaise Serves: 4
Estimated calories per serving (kcal)	509	339	708
Appetizer	**Sauteed chorizo**	**Bruschetta with tomato and basil**	**Fried chicken wings**
Ingredients	1 tbsp. olive oil, 1 red onion, 2 garlic cloves, 500 g chorizo, 100 ml red wine, 1 tbsp. honey Serves: 4	7 ripe tomatoes, 2 cloves garlic, 1 tbsp. olive oil, 1 tsp. balsamic vinegar, 6 basil leaves, 3/4 tsp. sea salt, 1/2 tsp. pepper, 1 baguette, olive oil Serves: 6	2 pounds chicken wings 1/2 cup butter, 1/4 tsp. garlic powder, 1 cup breadcrumbs, 1/2 cup Parmesan cheese, 2 tbsp. minced parsley, salt, pepper, chili sauce Serves: 5
Estimated calories per serving (kcal)	649	202	486
Starter	**Steak tartare**	**Vitello tonnato**	**Beet carpaccio**
Ingredients	4 ounces beef steak, 1 tbsp. olive oil, 1 tbsp. red wine vinegar, 1/2 tsp. salt, 1/2 tsp. pepper, fresh egg yolk, toast, minced shallot, pickled vegetables Serves: 2	½ kg veal roast, ½ stalk celery, ½ carrot, ½ onion, ½ leek, 175 ml white wine, 1½ bay leaves, 2 sprigs thyme, 2½ cloves garlic, 3 anchovies, 1 tbsp. capers, 1½ tbsp. Mayonnaise, olive oil, ¾ lemons, 200 g canned tuna, parsley, capers, salt, pepper Serves: 4	4 raw beets, 2 tbsp. balsamic vinegar, 1 lemon, 2 tbsp. mustard, 1 tbsp. Worcestershire sauce, 1 tbsp. fat-free yoghurt 50g rocket Serves: 4
Estimated calories per serving (kcal)	410	541	158
Dinner	**Aubergine stew**	**T-Bone steak**	**Cheeseburger**
Ingredients	2 large aubergines, 1 small red onion, 2 cloves garlic, ½ bunch parsley, 2 tbsp. capers, 1 handful olives 5 large ripe tomatoes, olive oil, 1 tsp. oregano, 2-3 tbsp. vinegar Serves: 4	1 kg T-bone steak, 1 kg potatoes, 1 bulb of garlic, 3 sprigs of rosemary, 1 bunch mint, 1 bunch flat leaf, 1 bunch of basil, 2 tbsp. capers, 2 gherkins, 2 anchovy fillets, 2 tbsp. red wine vinegar, 2 tsp. mustard, olive oil Serves: 4	olive oil, 2 onions, 600 g minced steak, salt, pepper, 1 bunch thyme, mustard, 4 slices cheddar cheese, 8 rashers smoked streaky bacon, 4 sesame seed buns, 200 g mayonnaise, 2 tsp. gentleman's relish, 1 lemon Serves: 4
Estimated calories per serving (kcal)	199	695	664

Note.: The estimated calories of all dishes are calculated using the recipe nutrition calculator from www.verywellfit.com or are taken directly from the recipes on the corresponding websites

F. Survey flow