

Children's perception of vegetarian supper

A study of the perception of 7- to 11-year-old Dutch children of three styles of vegetarian supper

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Abstract

The consumption and production of meat can be related to several health issues, environmental problems, and low animal welfare. Because of this, a transition towards a more plant-based diet is necessary. Children can play a big role in this transition as they affect their parents' shopping behaviour, and they can be seen as the consumers of the future. However, only little is known about children's perception of a vegetarian supper. Therefore, this research studied the perception of 7- to 11-year-old Dutch children of three styles of a vegetarian supper: one in which the meat is replaced by a meat analogue, one in which the meat is replaced by a meat substitute, and one in which the meat is not replaced but just left out. In this study, meat analogues are defined as meat replacers that resemble regular meat, and meat substitutes refer to meat replacers in the form of pulses. In total, 27 children were asked to keep a food journal for a week, to construct a dish using pictures made available by the researcher, and to participate in a one-to-one semi-structured interview. Results suggested the importance of taste, familiarity, healthiness, and meal composition in children's perception of a vegetarian supper. Furthermore, the results showed that the use of multiple methods fitted to the strengths of children, instead of just conducting interviews with them, can lead to a more diverse and thorough understanding of children's perceptions. It is therefore advised that further research could stress the aspects of taste, familiarity, healthiness, and meal composition. In addition, future research could make use of a mixed methodology that is fitted to the strengths and knowledge of the children.

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1 Introduction

The following chapter provides a background on the research topic and states the importance of having children as a study population. After that, the problem situation and project aim of the study are given.

1.1 Shifting diets

Over the past years, the consumption and therewith the production of meat have drastically increased. This situation, among others, has resulted in three problematic situations: environmental issues due to the emission of greenhouse gases (Ritchie et al., 2017; Higuera et al., 2023), an increased chance of health problems for people, including heart diseases and diabetes (Papier et al., 2021), and low animal welfare due to slaughtering (Fonseca & Sanchez-Sabate, 2022). An increase in these issues can be expected as the world population is still growing and more people will thus need to be fed. Numerous studies have been conducted that all show the same result: a transition from the consumption of meat-based products towards a (complete) plant-based diet is necessary (Pater et al., 2022).

In 2020 it was found that 95% of Dutch people aged 18 and above still eat meat, with 20% eating meat on a daily basis (CBS, 2021). With an average meat consumption of 76,7 kg per capita per year in 2017, 77,2 kg in 2018, and 77,8 kg in 2019 an increase has been shown in the meat consumption of the Dutch people over the past years instead of a decrease (Dagevos et al., 2020).

To be able to make a change in these problem situations, a shift towards a more or complete vegetarian diet is thus necessary. One of the most researched topics to lower the consumption of meat is the production of meat analogues (Delgado-Pando et al., 2023). In their research, Pando et al. (2013) described meat analogues as “products designed to emulate meat properties, but whose compositions are fully integrated with vegetarian ingredients” (p.4). Different studies use different names for these meat analogues, some of which are vegetarian meat, mimic meat, or plant-based meat (Ahmad et al., 2022). In the current study, the term meat analogue will be used to refer to these types of products. The main difference between meat analogues and other vegetarian protein sources, such as pulses, is the meat analogue’s intentional resemblance to meat in terms of, for instance, taste and texture (Collier et al., 2021). For the current study, meat substitutes refer to a meat replacer in the form of pulses.

According to research done by Markteffect (2022), 94% of the Dutch population is familiar with meat analogues. Besides the familiarity, it is also of great importance to understand the perception towards food products in order to successfully place food products into the market (Ruiz-Casillas & Herrero, 2021).

1.2 Perception towards a vegetarian diet

In most studies related to consumer perception, the population exists out of adults only. Multiple studies however mention differences between the way children and adults perceive food (Rose et al., 2004a; Nguyen et al., 2015), hence the importance of studying children’s perception as well. Even though insights into children’s perceptions can be very useful, academic insights are rather limited (Mulyawan et al., 2022). In addition, current research tends to place a high focus on isolated food products, whereas a meal consists of a combination of food products.

1.2.1 Children’s perception

Gaining insights into children’s perceptions of food products can be of interest in many ways when studying the shift towards a vegetarian diet. Parents or caregivers play a central role in the eating behaviour of their children, an example of which is by doing the grocery shopping and thus choosing what is available for their children to eat (Savage et al., 2007). It was found that food and drinks are actually one of the most top child-influenced products when it comes to parents’ purchasing decisions

(Mulyawan et al., 2022). Besides that, parents also act as role models of eating behaviour thereby influencing the development of children's food preferences (Birch, 2016). Likewise, children can also be influenced by other peers in their food preferences due to social pressure (Ragelienė & Grønhøj, 2020) or by getting exposed to unknown foods at school (Nyberg et al., 2020). Preferences gained through these peers can be brought home by the children, eventually potentially affecting their parents behaviour (Dikčius et al., 2019). Next to being influenced by others, children themselves also have an influence on their parents food-related shopping behaviour and choices. Children communicate their preferences towards their parents as to what they would like to eat, either at home or while assisting their parents during shopping (Dikčius et al., 2019). It was found that 85% of the parents value their children's opinion on what to buy (Mulyawan et al., 2022). Given this information, it can be stated that children's food preferences have a significant influence on their family eating behaviour (Dikčius et al., 2019; Mulyawan et al., 2022).

The influence children have on this eating behaviour tends to increase as they get older (Valkenburg & Cantor, 2001; Dikčius et al., 2019). At the age of 7 to 11 years old, children really start to try and persuade their caregivers into making the buying decisions they prefer. This leads to children having a higher level of influence over what is being bought. When children are aged 8 to 12 years old, they are able to critically evaluate products and information as they then develop a sense of detail and quality (Valkenburg & Cantor, 2001), making this an interesting target group to focus on.

Next to the effects children have on their parents, research also shows that children tend to be more willing to make changes in their food habits (Nyberg et al., 2020). A deeper understanding of their perception combined with a willingness to change their diet could thus help in the shift towards a vegetarian supper.

Finally, children can be seen as the consumers of the future. During their childhood, people tend to form product preferences that last well into adulthood. By gaining insight into their current perception of food products and using this information in product development, preferences can be formed towards vegetarian produce instead of meat-based products (Tuorila & Hartmann, 2020).

1.2.2 Food as part of a meal

Most of the food that is being consumed is food as part of a meal (Scholderer et al., 2013). However, in the majority of studies focusing on consumers' perceptions of food and their food preferences, the vision towards an individual product is examined. It has been shown that different combinations of foods affect consumers' evaluations of them (N.V. Olsen et al., 2015), hence the importance of studying a complete meal or dish instead of just one food product. According to the Rijksinstituut voor Volksgezondheid en Milieu (RIVM, 2020), around 75% of the meat consumption is consumed during the supper, which makes the supper an important meal to study.

There are different styles of vegetarian supper that can be made. Meat can be replaced by either a meat analogue or meat substitute, or the meat can just be left out. Other options are the use of insects or cultured meat. However, it is unlikely that the consumption of insects is included in the Western diet (Schoesler et al., 2012), and cultured meat can only be eaten and sold in two countries across the world (Van Eskers, 2023).

With all the aforementioned information in mind, the current study focuses on 7- to 11-year-old children's perception of three different types of vegetarian supper: in the first one the meat is replaced by a meat analogue, in the second one the meat is replaced with a meat substitute (an alternative vegetarian protein source in the form of pulses), and in the third one the meat is not replaced but just let out.

1.3 Problem formulation

As mentioned earlier, understanding children's perception of different kinds of vegetarian supper can be helpful in the transition towards a plant-based diet in several ways. Insights into children's perception of different types of vegetarian dishes is vital to product developers. These insights allow them to act upon children's preferences, creating demand and, therewith, stimulating buying behaviour among parents. The production of vegetarian products that meet the children's preferences could furthermore lead to the creation of plant-based eating habits for the children, which will continue into their adulthood (Tuorila & Hartmann, 2020).

1.4 Project aim

This study aimed to gain insights into the perception of 7- to 11-year-old Dutch children of three styles of vegetarian supper: one in which the meat is replaced by a meat analogue, one in which the meat is replaced by a meat substitute, and one in which the meat is not replaced but just left out. To do so, the following research question was formulated: *What is the perception of 7- to 11-year-old children of vegetarian suppers in which the meat is replaced by either a meat analogue, a meat substitute, or just left out?* The outcome of this can contribute to the shift towards a more plant-based diet, as a more thorough understanding of children's preferences and wishes can allow product developers to act upon this.

To come up with answers that will lead to the goal of this research, the following sub-questions were formulated:

1. What is the effect of various aspects of supper on the perception of 7- to 11-year-old children towards it?
2. What is the perception of 7- to 11-year-old children of a vegetarian supper containing a meat analogue?
3. What is the perception of 7- to 11-year-old children of a vegetarian supper containing a meat substitute?
4. What is the perception of 7- to 11-year-old children of a vegetarian supper containing neither a meat substitute nor a meat analogue?

2 Methodology literature study

A semi-structured literature search was conducted to find data resulting from earlier studies relevant to the research questions of the current research (Snyder, 2019). Furthermore, the data gained from the semi-structured literature search was used in composing the empirical study.

For the semi-structured literature search, first inclusion- and exclusion-criteria were defined. After this, core concepts and synonyms were drafted, with which search strains were made. Using this, articles were selected from which relevant data was selected per research question.

2.1 Inclusion and exclusion criteria

Inclusion and exclusion criteria were defined for the literature study. The criteria were applied to all articles and can be found in **Error! Reference source not found.**. Although this study specifically focused on children's perceptions, a few articles were used that contained information regarding adults' perceptions. This was done because in some fields, no information could be found regarding children's perceptions.

2.2 Core concepts and synonyms

Important terms from the research questions were identified and used as core concepts. To maximize the findings of relevant literature, synonyms were developed. The core concepts and synonyms are listed in **Error! Reference source not found.**. Search strains were constructed with these terms to find all relevant articles.

2.3 Selecting articles

For the selection of articles, the total number of hits was first sorted by relevance, according to the database that was used. After this, the titles and abstracts of these articles were screened in order of relevance. If the article was seen as relevant, the article was checked on the inclusion criteria, and the conclusion was read. When all the information here was regarded as relevant, the article was included in the current study and read completely to find the relevant information for this research. After this, the references of the article were checked to see if any other relevant articles could be found (snowballing). In total, 982 records were identified through Scopus and PubMed database searches. Having concluded the inclusion and exclusion criteria, the relevance screening, and the snowballing, 30 articles were included in the literature study.

2.4 Analysis of literature

Relevant information found in the articles was categorized per research question using a table in Microsoft Excel (Appendix II: Relevant article information categorised). When all articles were analysed, the information that was found per research question was checked, and assumptions were made that combined the information found in the articles. The assumption tables for each research question are listed in Appendix III: Assumption tables.

Table 1: Inclusion and exclusion criteria for articles found in literature search

Subject	Criteria	Explanation
Language	English and Dutch	Information in English and Dutch is used as the researcher understands both languages
Type of publication	Scientific papers	Scientific papers are a reliable source for scientific research
	Institutional statistics	Information from worldwide well-known organisations was used to obtain statistics on consumption patterns
Core information	Information related to children's perception of supper in general	Information relevant to the research questions
	Information related to children's perception of meat analogues	
	Information related to children's perception of alternative protein sources	
	Information related to children's perception of supper without meat analogues or alternative protein sources	
	Information above related to adults	Will be included when very little to no information on children's perception can be found
Database	Scopus	Databases used to find scientific articles
	PubMed	
	RIVM	Dutch institutes which provides statistic information on meat or meat analogue consumption in the Netherlands
	CBS	

Table 2: Research questions' core concepts and synonyms

Research question	Core concepts	Synonyms
RQ1	supper	dinner, evening meal, main meal
	aspects	characteristics, attributes, features, properties, elements
	children	kids, youth
RQ2/RQ4	supper	dinner, evening meal, main meal
	vegetarian	plant-based
	meat analogue	meat substitute, meat replacer, meat alternative, mock-meat, imitation meat, fake meat, vegetarian meat, plant-based meat
	children	kids, youth
RQ3/RQ4	supper	dinner, evening meal, main meal
	vegetarian	plant-based
	children	kids, youth
	alternative protein source	peas, nuts, pulses, beans, tofu, lentils, grains, seeds, plant proteins

3 Theoretical background

In this chapter, the already existing knowledge relevant to this study is given. First, the factors influencing children's food preferences are given, after which specific factors influencing children's perception of a vegetarian dish are mentioned. It must be noted that for the information regarding the dishes containing meat substitutes, a study was used which was conducted with adults instead of children. For dishes containing neither meat, meat analogues, nor meat substitutes no information relevant to the current study was found. At the end of this chapter, a conceptual model is given that visualizes the relevance of the information found to the research problem.

3.1 Factors influencing children's food preferences

According to numerous studies, there are multiple factors that determine children's food preferences. Preferences are of great importance in children's perception of food, as children tend to choose their food based on what they like and don't like (Hursti, 1999; Patrick & Nicklas, 2005; Da Quinta et al., 2021). The factors influencing children's food preferences can be distinguished into seven groups: product-related characteristics, child-related characteristics, the social context, the consumption context, the feeding style, the time context, and the meal composition.

3.1.1 Product-related characteristics

Product-related characteristics are attributes of the food product itself; examples of these are taste, salt content, and appearance. According to literature, multiple sensorial properties influence the product preferences children have (Rose et al., 2004b). The sensory modalities that are mentioned the most are taste and texture, with taste being the most important one (Koivisto and Sjöden 1996; Hursti, 1999; Rose et al., 2004b; Blanchette and Brug, 2005; Sick et al., 2019; Da Quinta et al., 2021; Chow et al., 2022). Besides taste and texture, the appearance, smell, and aftertaste are also mentioned as sensorial properties that affect children's food choices (Rose et al., 2004b; Jervis et al., 2014; Nielson et al., 2018; Sick et al., 2019).

With taste being a very general term, it is important to understand how taste affects children's product liking. Several studies mention the preference of children for sweet and salty flavours (Blanchette & Brug, 2005; Johnson, 2016; Liem, 2017) and the aversion to bitter flavours (Koivisto & Sjöden, 1996). Conflicting results were found for sour; both a preference (Koivisto & Sjöden, 1996) and an aversion (Blanchette & Brug, 2005) were found. For sweetness, it was even mentioned that sweetening vegetables could lead to a higher intake for children (Mennella et al., 2016). The level of sweetness preferred did depend on the product as some foods, according to children, are not supposed to taste sweet (Mennella et al., 2016).

Children's preferred texture for food products is dependent on their age, as this relates to the development of their oral processing skills (Chow et al., 2022). This suggests a preference for harder textures as children get older. For solid and semi-solid foods, the mechanical textural parameters (hardness, cohesiveness, crispness, and crunchiness) are of great importance in their acceptability. Different preferences for these parameters were found for different products, which shows the importance of the appropriateness of the texture for a food product (Chow et al., 2022).

The appearance of a food product also affects children's perception of it. Kildegaard et al. (2011) found that the appearance of a food product was essential to the acceptance or rejection of it by children. In their study, a significant difference was found in the preference for smoothies with different sizes, colours, and amount of visible fruit.

In addition to the sensorial properties, other product characteristics were also found to affect children's food preferences. Research done by Sick et al. (2019) mentioned perceived health (perception is based

on intrinsic attributes) as a possible reason to accept food, although not as common as taste. Contrary to this, Johnson (2016) stated that the addition of energy to a food product in order to increase its energy-density increases the likeability of that product, similar results indicating children's preference for energy-dense products were found in other studies (Koivisto & Sjödén, 1996; Blanchette & Brug, 2005).

3.1.2. Child-related characteristics

Next to product-related characteristics, the characteristics of the child also influence children's food choices. To start with, children's genetics influence both their likeability of foods (Johnson, 2016) and their willingness to try novel foods (Harris, 2008). Children's genetics also determine their gender, but whether or not their gender affects their food preferences is unclear, as conflicting results for this are mentioned in research (Nielsen et al., 2018; Sick et al., 2019). Furthermore, familiarity with different types of foods is an important factor in the acceptability and liking of foods as repeated exposure and thus becoming familiar with them leads to a higher likeability of that food (Hursti, 1999; Skinner et al., 2002; Wardle et al., 2003; Patrick & Nicklas, 2005). Studies done by Olsen et al. (2005) and Elzerman et al. (2021) even stated that combining familiar foods with unfamiliar ones in the same dish increased the children's willingness to try and acceptance of the latter. Furthermore, research by Sick et al. (2019) mentions curiosity as a reason to accept foods; contrary to this, food neophobia (the reluctance to eat novel foods) tends to lower the liking of foods (Mustonen et al., 2012). Furthermore, the degree of hunger influences children's food preferences as, when hungry, children prefer foods that could be prepared quickly to make them feel less hungry (Holsten et al., 2012). Also, the age of children affected the preferences they had for certain food products and meals (Nielsen et al., 2018). Finally, emotions were found to influence children's food preferences (Ragelienė, 2021). Negative emotions evoked by, for instance, stress could lead to emotional eating, which leads to a preference for sweet and fatty foods (Michels et al., 2012).

3.1.3 Social context

The social context has an effect in various ways. First of all, children's parents, besides being the ones that determine largely what food is available for the children, act as peers for the children in their development of product preferences (Birch, 2016); other people in the child's environment, such as their friends, can also act as these peers (Ragelienė & Grønhøj, 2020). Besides that, ethnicity and cultural background affect children's food preferences as well (Hursti, 1999; Patrick & Nicklas, 2005). More specifically, research by Chow et al. (2022) indicates the importance of cultural background in texture preferences. Furthermore, the socio-economic status of the parents plays a role as it was found that children of well-educated parents were more familiar with more kinds of foods (Mustonen et al., 2012) and, as described earlier, familiarity with food affects children's food preferences.

3.1.4 Consumption context

Companionship in general tends to positively influence children's dish perception, and eating dinner together as a family was positively related to vegetable intake (Patrick & Nicklas, 2005). The presence of at least one parent was also found to be relevant to the child's dish preferences, as the lack of presence resulted in a higher preference for convenience food (Holsten et al., 2012). Furthermore, it is also shown that children affect each other when eating together, as children who eat with older children tend to like what the older child eats (Hursti, 1999).

3.1.5 Feeding style

Children's dish perception is also influenced by the feeding style their parents use. Feeding styles are the way parents maintain or try to change their children's eating behaviour and can be distinguished into three types: authoritarian, permissive, and authoritative (Patrick & Nicklas, 2005). In their paper they describe authoritarian feeding as a feeding style in which the parents completely control what their children eat by restricting certain foods and forcing the consumption of others. Permissive feeding includes a complete free choice for what the children want to eat, and authoritative feeding includes a balance of the other two by encouraging their children to eat healthy but also by giving them some choices in their food intake. All three feeding styles were found to influence children's food preferences, as the encouragement or forcing to eat specific foods tended to decrease the liking of that specific food, whereas trying to limit children from eating something increased the liking of that food. In addition to that, the permissive feeding style led to a lower intake of healthy foods (Patrick & Nicklas, 2005). Similar results were found by Hursti (1999), who stated that using food as a reward for something increased the liking, while using food as a means decreased the liking of it.

3.1.6 Time context

A study by Holsten et al. (2012) mentioned the influence of time context on children's food preferences. According to their study, eating times, time of the day, and time of the year all influence children's food choices. Eating time affects their food choices as this is related to the amount of hunger children tend to have, time of the day relates to which kinds of foods they find appropriate to eat, and time of the year includes that the outside temperature or seasonal foods might make some foods more appealing than others. Also, the day of the week was found to be influential, as weekends were seen as a time to enjoy energy-dense foods (Holsen et al., 2012).

3.1.7 Meal composition

As mentioned earlier, serving familiar foods together with unfamiliar ones affects the consumption of the latter (Olsen et al., 2015; Elzerman et al., 2021). This suggests that the composition of the meal affects one's perception of it, which was indeed indicated by another study. In a study by Nielson et al. (2018), it was found that the amounts of food presented and the colour combinations influenced children's eating behaviour. Besides the colour combinations, the way the different food products were located on the plate was also found to have an effect. A difference was found between the preferences for dishes that contained the same food products but were served separated, mixed, or in-between (Nielson et al., 2018). Depending on the dish and the children's age and gender, different serving styles were preferred.

3.2 Factors influencing the perception of dishes containing meat analogues or meat substitutes

The above-mentioned information is relevant when one looks at the factors influencing dishes in general. For dishes containing meat analogues or meat substitutes, some additional information was found.

For meat analogues, it is important that they resemble meat in colour, texture, and taste (Pater et al., 2022). Meat analogues tend to have a lower sensory attractiveness than actual meat, which is a key barrier to the acceptance and likeability of the analogues (Hoek et al., 2011). Furthermore, consumers should be able to recognize that the meat analogue or meat substitute is meant to substitute the meat in a dish (Elzerman et al., 2011). The size of the meat analogues was also found to be relevant, as smaller meat analogues tend to be more acceptable as they are served as part of a dish, for instance in a soup (Elzerman et al., 2011). This relates to the importance of the meal context as described earlier, which was also found to be relevant for dishes containing meat analogues and meat substitutes

(Elzerman et al., 2011; Elzerman et al., 2015; Elzerman et al., 2021). Especially for meat analogues the meal composition was found to be important, as other ingredients could mask the flavour and texture of meat analogues, making them more acceptable (Elzerman et al., 2011). Finally, both meat analogues and meat substitutes were found to be more appropriate than the use of meat products when wanting a healthy meal (Elzerman et al., 2021). For meals in general, meat substitutes were seen to be more appropriate to use in a dish than meat analogues when tested in multiple usage situations (Elzerman et al., 2021).

For the acceptance of pulses as meat substitutes in dishes, Onwezen et al. (2021) found multiple barriers and motives. Health, environment, and weight control were motives for the choice of pulses over meat. Taste, flatulence, too little variety, versatility, and a lack of perceived benefits are the barriers given. In addition to that, people's social environment and family preferences are seen as important factors in the acceptance of the use of meat substitutes.

3.3 Conceptual model

The relation of the data found in the literature study to the research problem of the current study is visualized in Figure 1. As can be seen, the product characteristics and people-related characteristics, together with the social context, feeding style, time context, and meal composition, affect the children's perception of a (vegetarian) supper. The information found on factors influencing the perception of dishes containing meat analogues or meat substitutes has not been used in the conceptual model, as this information is not based on research in which the target population consisted of children. This information was solely used as background information for the current study. The actual perception children have of the three vegetarian suppers was researched by means of an explorative interview, as no information on this was found in the literature study. The information presented in the conceptual model was used in constructing the interview guide.

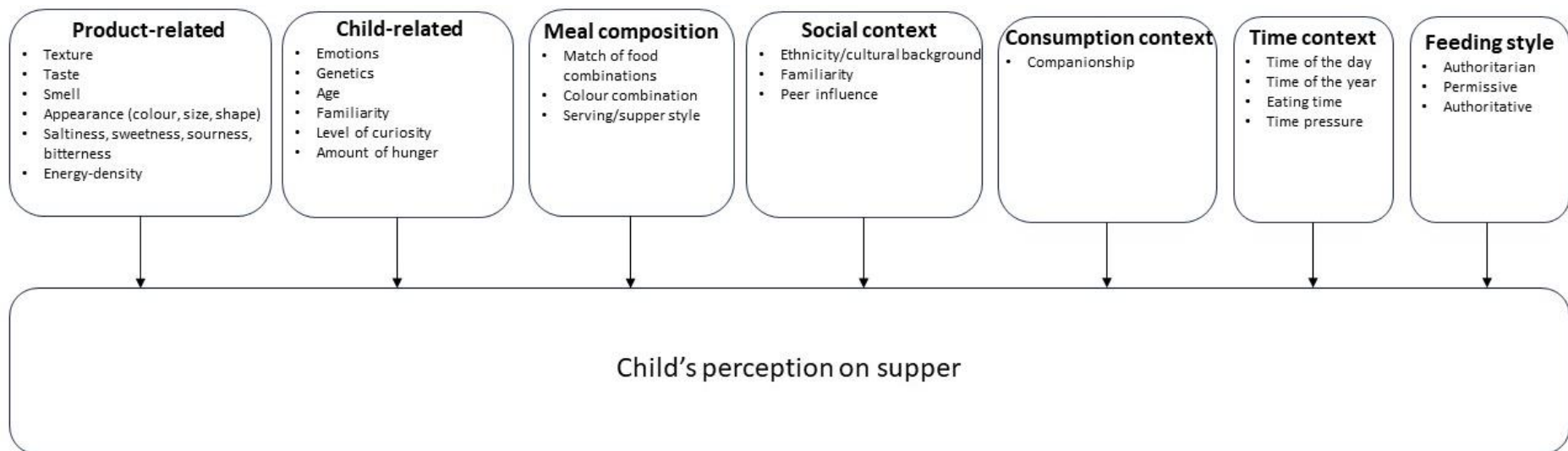


Figure 1: Conceptual model

4 Methodology of empirical study

Through the empirical study, data was gathered that enabled a more thorough answering of the research questions, filled in the research gap about children's perception towards vegetarian supper, and enabled comparing the data with data found in the literature (Flynn et al., 1990) to a certain extent.

An explorative empirical study was performed to gain insights into the perception of children of three kinds of vegetarian supper. The empirical study was explorative, as no information on the subject was found in the literature study. Three tasks were performed for the empirical study. For the first part, the children got a small assignment to do at home together with their caregivers. Next to this, a creative activity was conducted by the children in class. Following these assignments, in-depth one-to-one semi-structured interviews were held with the children using an interview guide. In this chapter, first the recruitment of the participants is described, after which the three components are further elaborated.

4.1 Recruitment of participants

For the recruitment of the Dutch children that participated in this study, convenience sampling was used. By using the social environment of the researcher, two primary schools were contacted, and their willingness to participate was checked. Both schools participated in the study; one was located in Nijmegen, the other in Bommel. To ensure the privacy of the children and deal with ethical considerations, caregivers were asked to give informed consent about the participation of the children. It was mentioned that participation was voluntary and that the information would be treated confidentially. Besides asking for their consent, the parents were also asked about the consumption pattern of their family regarding meat, meat analogues, and meat substitutes. Children were asked for their consent before the start of the interview.

Participants were selected based on their age. For them to be included in the research, the participants had to be between 7 and 11 years old, as children of this age are able to critically evaluate products and start to influence their parents' shopping behaviour (Valkenburg & Cantor, 2001). Other criteria such as gender, ethical background, or whether they were vegans, vegetarians, or meat consumers were not applied, as a diverse sample was preferred.

4.2 Supper journal

Journals can be used to make participants write down certain events and their reactions to these events over time (Groundwater-Smith et al., 2015). The participating children were asked to keep a food journal on paper for a period of one week. In this journal, the children were asked to write down what they had for supper on each day, including mentioning the ingredients used, and what they did or did not like about it. The children also rated each dish by colouring in a number of stars, with a maximum of five. An example page of the supper journal can be found in Appendix V: Supper Journal. The complete journal existed out of seven of these pages, one for each day of the week. The children were asked to take their journal home and fill it in directly after finishing their supper. The journals were handed in a week before the start of the interviews. The data gained from these journals helped to gain insights into the children's eating behaviour and preferences, and it was used in the interview conducted later. Besides that, filling in the journal made children more conscious of what they had for dinner, which could help them express their thoughts during the interview. The ratings they gave were used to check if they provided different ratings for different types of supper.

4.3 Picture collage

Research done by Clark (2010) mentions the importance of using methods fitted to the strengths and preferences of children. Besides that, the method should enable the children to participate in their own way (Coyne et al., 2021). Letting children create something on their own, such as a drawing, and including this creation in the research creates a feeling of co-creation or co-researching for the children (Barfield & Driessnack, 2018). This feeling helps to reduce any possible tension present for the children, which is of help in, for instance, the one-to-one interviews (Coyne et al., 2021). An example of this creation method is given by Groundwater-Smith et al. (2015), where the creation of collages by children is described as a useful research instrument. Ragelienė (2021) also mentioned projective methods as a valid technique to use with children.

In the current study, children were asked to create their favourite vegetarian dish by cutting out pictures made available by the researcher. The children received a picture of an empty plate and a collection of pictures, Appendix VI: Pictures used in picture collage, based on the most consumed vegetables and pulses in the Netherlands (Voedingscentrum, n.d.), combined with starchy food products and commonly available meat analogues and meat substitutes. Each picture was accompanied by a written description of it. This method was chosen instead of drawing as it allowed less room for error in interpretations, and research has shown that the use of pictures provides reliable information on children's food preferences (Kildegaard et al., 2011). The children were also asked to write down their favourite or most important ingredient among the ingredients they had chosen and to name their dish. The children were given 20 minutes to complete the task and there were no restrictions on the number of ingredients they could choose. The task was conducted individually in class and one researcher was present to answer any questions during the task. The creations of the children, together with their food journals, were used in the one-to-one interviews. Furthermore, the picture collages provided insights into the preferences of the children.

4.4 Materials

Pictures were used in the interview to assess children's food perception, as research done by Olsen et al. (2012) showed that children's food preferences measured using pictures were in concordance with hedonic product evaluations and actual product choices. The pictures, Figure 2, display several different vegetarian dishes and were used from a study done by Nielson et al., (2018) who studied the effect of serving style on food preferences among children. A description of each dish was provided to the children. From left to right, these are: *Potatoes and vegetables*, *spaghetti Bolognese*, *stir-fry with rice*, *a wrap*, and *a pasta salad*.



Figure 2: Dishes presented during the interview (images retrieved from Nielson et al., 2018)

4.5 Semi-structured interviews

A semi-structured interview was conducted using a prior established interview guide, Table 3, with pre-determined open-ended questions based on the data gathered from the earlier conducted literature study. The complete interview guide, including an introduction and definitions that were provided to the children, can be found in Appendix IV: Interview guide. A semi-structured interview was used, as this allows the researcher to more easily compare the answers given by different participants and to make sure that all relevant aspects were brought up while still leaving room for the children to express their own thoughts (Groundwater-Smith et al., 2015). Besides that, research done by Pater et al. (2020) showed that conducting one-to-one in-depth semi-structured interviews with children can yield useful insights into children's perception of food topics.

Table 3: Interview guide

Supper at home

- In your journal I saw that you do/do not always eat meat during supper, what do you think about this? What do you normally eat when you do not eat meat during supper?
- What do/don't you like about eating vegetarian supper at home?

Questions about meat analogues and substitutes

- Do you know what meat analogues/substitutes are? Can you explain this?
- Do you sometimes eat meat analogues/substitutes? Which one(s) do/don't you eat and what do/don't you like about them?

Picture collage

- Could you tell me something about the picture collage you made? What is the dish and why did or didn't you chose certain ingredients?
- In the assignment you had to choose out of pictures, were there any products not available that you would like to have used?
- In your dish you did/did not choose to use meat analogues/meat substitutes/none of those two, why did/didn't you?

Perception of dishes displayed in Figure 2

- Which of these dishes would you prefer to eat? Why?
- Would you eat this at home instead of dishes you eat that contain meat? Why?
- Which of these dishes would you prefer the least? Why?

Perception of dish chosen in previous question presented in three vegetarian styles

- What do you think of this dish containing a meat analogue?
 - What is your favourite kind of legume? What do you think of this dish containing that legume as a meat substitute?
 - What do you think of this dish containing neither a meat analogue or meat substitute?
 - Which of these dishes would prefer to eat? Why do you chose this one over the others?
 - Would you eat this at home instead of dishes you eat that contain meat? Why?
 - Which of those dishes would you prefer the least? Why?
 - Can you think of a dish in which you would make a different choice (meat analogue/substitute/none of those). Why would this change your choice?
-

Research done by Groundwater-Smith et al. (2015) provided helpful insights into how to conduct interviews with children, such as how to create an accessible space for them. Special attention was paid to this in setting up the interview. At the start of the interview, it was made very clear to the children that there were no good or wrong answers and that it was their opinion that the researcher had an interest in. This was done to try and minimize their answers being influenced by social desirability and norms. A pilot interview was conducted to test the interview guide on timing, comprehension, and whether the questions yielded answers useful for the study. After the pilot, necessary adaptations were made. These adaptations included the addition of the first three questions of the last part of the interview.

The interviews were conducted face-to-face between November and December 2023 by one interviewer. The interviews took place in a room based at the primary school, and only the interviewer and interviewee were present. Children were taken from the classroom one by one by the interviewer to conduct the interview. The interviews took around eleven minutes each. All interviews were audio-recorded after obtaining consent from the interviewee. After the interview, the interviewees were given a small present to thank them for their contribution to the study.

4.6 Data analysis empirical study

Before analysis, the data from all three components of the empirical study was anonymised. This was done by assigning a number to each of the children's names. Numbers were used to be able to connect the answers from the children for each component to each other.

For the supper journal, an oversight was made showing how often children eat meat, meat analogues, meat substitutes, or none of those in a week. In addition to that, the average score a child gave his/her dishes was calculated. Frequency tables were made for the collages to show how many times meat substitutes, meat analogues, or none of those were chosen by the children as meal components. Furthermore, the collages were used in the interviews with the children as described in the paragraph above.

All interviews were transcribed using Whisper, checked against the audio recordings made during the interview and imported into ATLAS.ti 23. All 26 interviews were open-coded, Level I coding (Hahn, 2008), by the researcher and points of interest were noted in memos to ease data analysis. After open-coding all interviews, the codes were verified by checking all transcripts again with the formulated codebook. Having finished level I coding, the data was further refined by comparing codes on similarities, differences and reliability (type II coding) (Hahn, 2008).

5 Results

In this chapter, the results of the empirical study are presented. First, the participant characteristics are described. Hereafter, the data gathered from the food journals and picture assignments are mentioned, and the results from the interviews are given. Finally, a schematic representation of the results is given.

5.1 Participant characteristics

In total, 27 children participated in the study, 26 of whom were interviewed. One child missed the interviews due to being ill. This child was still included in the study, as he or she did provide data through the food journal and picture collage. The participant characteristics were based on information provided by the parents of the children. All participants were aged between 8 and 10 years. Approximately half of the children were male (N=12) and half were female (N=15). Nearly all participants (N=23) consumed meat or fish at least once a week during supper, where roughly half of the children (N=13) consumed meat analogues at least once a week during supper. Several (N=10) consumed meat substitutes at least once a week during supper, and about half of the children (N=13) consumed neither meat nor fish, meat analogues, or meat substitutes at least once a week during supper. The parents of three children did not provide data on their consumption patterns, which explains why N=24 instead of 27. An overview of the aforementioned consumption patterns is displayed in Table 4.

Table 4: Meat, meat analogue, and meat substitute consumption of the children (N=24)

Consumption frequency	Number of children
Meat consumption	
Never	1
1-2 times a week	1
3-4 times a week	9
5-6 times a week	9
Each day of the week	4
Meat analogue consumption	
Never	12
1-2 times a week	8
3-4 times a week	3
5-6 times a week	0
Each day of the week	1
Meat substitute consumption	
Never	15
1-2 times a week	6
3-4 times a week	2
5-6 times a week	1
Each day of the week	0
No meat, meat analogue, or meat substitute consumption	
Never	13
1-2 times a week	10
3-4 times a week	1
5-6 times a week	0
Each day of the week	0

5.2 Food journals

In total, 21 out of the 27 children handed in their journals with information on what they had for dinner the week before and what they liked or disliked about the dishes. Table 5 provides an overview of the sorts of dishes they had for dinner. If no information on that day was provided, the cell was left white. The numbers in each cell are the scores, with a maximum of 5, the children rated that specific dish. The last column shows the average score the child gave a dish that week.

Table 5: Sorts of dishes consumed by the children throughout the week

Participant	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Average score
1	2.5	4.5	5	2	4.5	4.5	5	4
2		4	1	5	5	3	5	3.8
3		4	5	3	4.5		5	4.3
4	5	3	2.5	3.5	2.5	2.5	3.5	4
5	4	3	2	2	4	5	5	3.6
6	4	4.5	5	5	4.5	4	5	4.6
7	5	4.5	5	3	5	5	4.5	4.6
8	3	1	1	5	4	5	3	3.1
10	5	3.5	4.5	4	3.5	4.5	5	4.7
12	1.5	1.5	2.5	4.5	3.5	4.5	5	5
13	2.5	3	4	3.5	5	4	4	4
15	5	1	5	4	4	5	1	3.6
16	3	5	3	4	4	2	1	3.1
17	3.5	4	3.5	4.5	3.5	5	4	4.3
18	3	5	5	5	5	5	4	4.6
19	3	3.5	4	5	4.5	5	2.5	4.3
20	4	3	4	5	3	5	5	4.1
22	3	5	3.5	4.5	4.5	4	5	4.3
25	5	3	5	2	5	2	2	3.4
26	4	2.5	4.5		3	3.5	5	4
27	4	5	5	4	5	5	5	4.7

■ = meat ■ = meat analogue ■ = meat substitute ■ = meat analogue and meat substitute ■ = no meat or meat replacer

Of the 185 dishes that were consumed, 11 contained just a meat analogue, 6 contained just a meat substitute, 3 contained a meat substitute and a meat analogue, and 19 contained neither meat, a meat analogue, nor a meat substitute.

When a vegetarian dish was served to the children, none of them mentioned that they did not like the fact that the dish was vegetarian. Some children (N=5) mentioned to not like the meat in one or more dishes. One child mentioned not liking the meat analogue he or she was served, where others (N=5) did specifically mention to like the meat analogue. Only one child mentioned to like the meat substitute he or she was served, and some others (N=4) did not like the meat substitute.

The average score that children rated the dishes is displayed in Table 6. For the vegetarian dishes, the dishes that contained neither a meat analogue nor a meat substitute scored the highest, and dishes containing both an analogue and substitute were rated the lowest. Between a dish with a meat analogue and a dish with a meat substitute, almost no difference was found. It should be stated that these average scores were calculated based on a small number of dishes.

Table 6: Ratings of dishes in the food journals

Dish containing	Average score	# Dishes	# Children
Meat	4,0	103	20
Meat analogue	3,3	10	6
Meat substitute	3,4	5	5
Meat substitute and meat analogue	3,0	2	1
None of the above	3,9	12	1

5.3 Picture collage

All 27 children constructed a dish on paper using the pictures available (Appendix VI). An example of one of the dishes is displayed in Figure 3: Picture collage respondent 12. Whether the dishes the children made contained a meat analogue, a meat substitute, both, or neither of those two is stated in Table 7. When asked for the most important ingredient of their dish, a few children (N=3) named the meat analogue and only one child mentioned the meat substitute. Most children (N=23) did not mention the meat analogue or meat substitute as the most important part of the dish.



Figure 3: Picture collage respondent 12

Table 7: Sorts of dishes constructed in picture collages

Sort of dish	Number of children that constructed the dish
Contains a meat analogue	10
Contains a meat substitute	2
Contains a meat analogue and meat substitute	4
Contains none of the above	11

Of the children that chose to use a meat analogue in their dish, most (11) were familiar with meat analogues, while only a few (3) were not familiar with them. For the children that did not choose to include a meat analogue, about half (N=7) were familiar with meat analogues and half (N=6) were not.

In the interviews, most children (N=16) did not mention they had missed the option to choose meat in the picture assignment when asked about this, where some children (N=10) would have liked to have the option to choose meat. Of these 10 children, 4 had chosen a meat analogue in their dish, 2 chose a meat substitute, 1 chose both a meat substitute and a meat analogue, and 3 chose none of the aforementioned.

5.4 (Vegetarian) supper

In the text below, first the important aspects of supper, according to children, are given. After that, the children's perception of a vegetarian supper in general are mentioned.

5.4.1 Important aspects of supper

Several important aspects of supper resulted from the interviews with the children, but the most mentioned one was that the food had to be tasty. Nearly all the explanations children gave for liking certain foods were that they were tasty. The children found it hard to explain what tasty meant to them, one mentioned that food should be sweet. Others (N=2) mentioned the absence or presence of certain ingredients that they did or did not like, or being familiar with the food (N=2) as a reason for them to like it. Several children (N=9) indicated they did not like it when they had to eat a lot of vegetables.

Another important aspect was the familiarity children had with the food. Being familiar with food was mentioned many times as a reason to like that food. "I like spaghetti a lot because I eat it very often" [Child 16]. Likewise, children would rather not eat food they did not know, as they were not certain if they would like the taste of it. Eating a new food several times would lead to a higher liking of it. "If I eat that more often, I will start liking it" [Child 15].

The healthiness of a dish also mattered to children, as multiple children (N=11) indicated they preferred to eat healthy. Only two children said they did not care about the healthiness of a dish.

Some less-mentioned important aspects of supper are that the amount of food that is served should be large (N=2), that the dish should be hot (N=1), the dish should include foods with textures that are crispy from the outside and soft from the inside (N=3), the dish should look appealing (N=4), and that the dish should include a sauce (N=1).

5.4.2 Perception towards vegetarian supper

Most of the children (N=18) were fine with the idea of eating a vegetarian dish multiple times a week. The children that did not want to eat vegetarian (N=4) did not want this as they would miss eating meat too much. Multiple children (N=8) could not think of any advantages or disadvantages to eating vegetarian.

Several reasons were provided for eating vegetarian. The most common one (N=15) was that eating vegetarian is good for the animals, as no animals should be slaughtered. Healthiness (N=3) and the environment (N=6) were also mentioned, as the children thought not eating meat all the time was better for their health. Furthermore, some dishes just did not need any meat with them, or social aspects played a role. "Sometimes I think about my granddad [who is a vegetarian] and then I eat vegetarian" [Child 5]. The taste of meat was both a reason to eat vegetarian and to not eat vegetarian, as some children did and some did not like the taste of meat products.

When asked what they ate when they did not eat meat, some children (N=8) mentioned they had meat analogues, two children mentioned pulses, and some others (N=8) said they did not replace meat with something specific. Also, several children (N=7) talked about complete dishes, mostly rice.

For some children (N=8) there were some uncertainties surrounding the concept of a vegetarian dish. Half of them linked a vegetarian dish only to a dish that included a meat analogue. Also, some of them (N=4) thought they had to be a vegetarian in order to eat vegetarian dishes. "I did not choose that [a meat analogue] because I am not a vegetarian" [Child 6].

5.5 Children’s perception towards a vegetarian supper containing a meat analogue, a meat substitute, or no meat replacer

During the interviews, the children were shown several pictures of vegetarian dishes containing a meat analogue, meat substitute, or neither a meat analogue nor a meat substitute. Their perception towards these dishes as well as towards vegetarian dishes with a meat analogue, meat substitute, or neither a meat analogue nor meat substitute in general was asked.

Most children (N= 19) were generally positive about a meal containing a meat analogue instead of meat. A couple of children (N=3) mentioned really preferring a meal with actual meat, and others (N=4) were not sure as they were unfamiliar with meat analogues. Of the children that were positive about the meat analogue meal, some thought they would really like it, where others said it did not really matter to them as long as it would not taste bad.

Several children (N=15) were generally okay with a vegetarian dish containing a meat substitute. Only a few of them (N=4) mentioned they would actually find it tasty to eat such a dish, whether most of the others described a dish with a meat substitute as "it would be fine, not tasty but okay, it doesn't matter". Some children (N=9) were negative about a dish containing a meat substitute. According to them, the taste of the dish would change too much when the meat was replaced by a meat substitute in the form of pulses, or they just did not like the taste of pulses at all.

Most children (N=21) had a positive or neutral opinion about a vegetarian dish containing neither a meat analogue nor a meat substitute. One child even started talking about the dish without having been asked about it. “[When replacing meat] I would just remove it and not replace it with something” [Child 5]. Reasons for them liking the dish are finding the dish tasty, not liking meat substitutes and/or meat analogues and not finding meat, meat analogues, or meat substitutes the most important part of the dish. “I do not care because the spaghetti is the most important part of the dish” [Child 22]. Only a few children (N=3) would not like a vegetarian dish containing neither a meat analogue nor substitute, where one of them stated he or she would not eat it. They would miss the meat or a replacement for meat.

When the children had chosen a favourite dish from the pictures presented during the interviews, they were asked which of the three vegetarian options (meat analogue, meat substitute, or neither a meat analogue nor meat substitute) they would prefer the most for that dish and which option they preferred the least. As can be seen in Table 8, a dish containing a meat analogue was the most favoured option, followed by a dish with neither a meat analogue or meat substitute. A vegetarian dish with a meat substitute was the most unfavourable option, as can be seen in Table 9.

Table 8: Preferred vegetarian dish option by children

Preferred dish option	Number of children (N=26)
Meat analogue	15
Meat substitute	3
No meat analogue or meat substitute	9

Table 9: Least preferred vegetarian dish option by children

Least preferred dish option	Number of children (N=26)
Meat analogue	5
Meat substitute	12
No meat analogue or meat substitute	7
No choice	9

During the interviews, multiple overlapping topics emerged when speaking about the three vegetarian dish options. These themes are taste, familiarity, meal composition, variation, meat analogues and meat substitutes itself, and health, which are separately discussed below.

5.5.1 Taste

The taste of products and dishes was mentioned almost every time when the children were asked why they preferred specific products and/or dishes over others. The children were willing to make other or new choices in their consumption pattern as long as the new options would taste just as good or better than the ones that they would otherwise consume. *"I like the taste of it just as much, so then I would choose the vegetarian meat"* [Child 10].

Only a few children (N=5) specifically mentioned they liked the taste of meat analogues in general. Most of the others said it depended on the kind of meat analogue or they did not know if they liked it or not as they were not familiar with meat analogues. One child really did not like dishes with meat analogues as those dishes lacked taste.

Some children (N=11) did not like the taste of meat substitutes. They preferred it when the meat substitute was incorporated in the dish in such a way that you would not taste the meat substitute. Other children (N=10) did like the taste, so they did not mind when meat substitutes were used in a dish. It did matter which sorts of pulses were used as a meat substitute as some were accepted more than others by the children.

For the dishes containing neither a meat analogue nor a meat substitute, no data was gathered on taste.

5.5.2 Familiarity

Several children (N=6) found it hard to assess their likeability of meat analogues as they were not familiar with them. They were less likely to choose meat analogues as a meat replacer as they did not know if they would like them. *"I do not know what it tastes like, so I do not know"* [Child 16]. On the other hand, children that did eat meat analogues on a regular basis did like them as they knew they liked the taste and were used to it. *"Because I eat that a lot, so I'm used to it"* [Child 10].

Most children who did not eat meat analogues at home (N=7) were curious and open to trying them. They said they were either curious, eager to try new things, or found it important to try and get used to new flavours. *"I find it important to try new things to eat. Then I can see if I like that"* [Child 3].

The importance of familiarity with meat analogues was also shown in the picture assignment. Of the total number of children that included a meat analogue in their dish (N=14), most of them (N=11) were familiar with meat analogues. Out of the children that were not familiar with meat analogues (N=9), most children (N=6) did not include a meat analogue in their dish. From the children that chose a dish with a meat analogue as their least favourite option in the interviews (N=5), again most of them (N=3) were unfamiliar with them. Of the children that were familiar with meat analogues (N=17), most (N=12) chose the dish with a meat analogue as their favourite option.

All children were familiar with the taste of meat substitutes. Some children (N=7) mentioned liking a vegetarian dish containing a meat substitute as they were familiar with the taste and ate it on a regular basis at home. One child was eager to try it but could not yet say what he or she thought about it.

Few children (N=3) were not familiar with vegetarian dishes containing neither a meat analogue nor a meat substitute and found it hard to assess their liking of such a dish. For some other children (N=2), familiarity with food was a reason to like a vegetarian dish containing neither a meat analogue nor meat substitute as they were not familiar with such meat replacers. *"I would try a meat analogue but*

I know that I can trust a vegetarian dish containing neither a meat analogue nor meat substitute” [Child 1].

5.5.3 Meal composition

For most of the children (N=17), the meal composition influenced the preferences children had for the use of meat analogues, meat substitutes, or none of those two.

For a meat analogue, it mostly mattered whether a dish existed out of loose components or that all the different parts were mixed, such as in a burrito. Some children (N=4) preferred it when a meat analogue was used throughout the dish, as they thought the taste of the other produce would be dominant or mask the flavour of the meat analogue. For multiple children (N=4), their preferred meat analogue was dependent on the dish in which it was used, as the meat analogue should fit with the other ingredients.

The composition of the dish also influenced the choice between a meat analogue, a meat substitute, or no replacement as a meat replacer. One child preferred a meat analogue over other meat replacers when the analogue was used as a loose component of the dish because that would mimic a dish with regular meat the most. Another child would normally prefer the use of a meat analogue, but preferred to use a meat substitute in burrito's.

For some children (N=11), their preference for a dish containing a meat substitute over other vegetarian dishes was dependent on the sort of dish. *“Because this is a pasta salad and that should just be with vegetables” [Child 23].* Some said that the meat substitute should be incorporated into the dish and not just eaten by itself for them to like it.

Multiple children (N=11) indicated they would miss a meal component when no meat or meat replacer was used in a dish. They would either miss the taste of meat or a meat replacer or just the physical presence of an extra dish component. *“I don't like to just eat vegetables” [Child 9].* One child would not miss a dish component, as he or she said that meat or a meat analogue/substitute was not the most important part of a dish. It was also mentioned that some dishes did not really need meat or a meat replacer, hence their preference for a dish containing neither of those.

5.5.4 Variation

For all three sorts of vegetarian dishes discussed, children who were not vegetarians found it important to alternate between those vegetarian dishes and dishes that contained meat.

For dishes containing meat or a meat analogue, children (N=2) thought alternating between these dishes would be better for their health, and they found that eating one thing too often makes it less tasty (N=3). The taste of a dish was leading in their preference for one of the two dishes. *“If this one is more tasty, than I want to eat that one more often” [Child 23].*

Children that were okay with eating a vegetarian dish with a meat substitute said they would prefer to alternate between dishes containing a meat substitute and meat instead of just eating the meat substitute dishes. The reasons for this were that they would otherwise miss the meat or get bored by eating the same things.

For vegetarian dishes containing neither a meat analogue nor meat substitute no specific reasons were given why the children would alternate but they would do so.

5.5.5 Health

Around a quarter of the children (N=7) talked about health when discussing the three different sorts of vegetarian dishes. None of the children thought that there was a difference in healthiness between vegetarian dishes containing a meat analogue, meat substitute, or none of those two.

Half of the children (N=2) that talked about health regarding meat analogues (N=4), thought that dishes with meat analogues would be more healthy than dishes with meat, as analogues are made out of plants. The other two children said that this did not matter to them, as a meal already contained enough vegetables. *"I do not think that there is a difference because a dish contains enough vegetables already"* [Child 1]. Taste was seen as more important than the healthiness of a dish.

Of the children that talked about the healthiness of a dish containing a meat substitute (N=5), most (N=4) thought that a dish with a meat substitute was healthier than a dish with meat. Only one child thought there was no difference as a dish already contained enough vegetables.

Just a few children (N=2) talked about the healthiness of a vegetarian dish containing neither a meat analogue nor a meat substitute. One child did not see a difference between a dish containing meat, a meat analogue, a meat substitute or neither of these, as a dish already contained vegetables. The other child thought a dish without meat was less healthy as he or she thought his or her iron-intake would become too low without eating meat.

5.5.6 Type of meat replacer

The presence of a meat analogue or meat substitute in a dish affected the children's liking of the dish. This could be positive when they liked the analogue and/or substitute and negative when they did not like them.

For several children (N=11), whether they liked a meat analogue or not depended on the analogue that was used. Others said they just liked (N=2), or did not like (N=1) meat analogues in general. One child mentioned he or she could not assess his or her likeability of meat analogues as he or she was not familiar with them. Reasons that were given for not liking the taste of a meat analogue were that the analogues were too spicy, had a lack of taste, and did not taste similar to real meat. The texture of the meat analogue was also mentioned as important, as they sometimes were too chewy, too soggy, and did not resemble meat in their texture as well. One child was positive about the texture of a meat analogue.

When asked if meat analogues should resemble meat as much as possible, multiple children (N=10) said that this did not have to be the case. They found it important that the meat analogue should be a tasty product itself. Some children (N=4) did mention they would like a meat analogue to taste like meat. A few children (N=4) were not always sure whether they ate meat analogues or real meat. They thought that meat analogues already resembled meat very well. Two children said they never tried a meat analogue, while their parents said they consumed meat analogues once a week. This could indicate that these children did not see the difference between meat and a meat analogue.

Multiple children (N=12) did not see a meat substitute as a meat replacer, but more as a vegetable that is served besides meat or a meat analogue. *"We normally eat a meat analogue and peas together"* [Child 13]. Some children (N=6) said that they already ate meat substitutes as a meat replacer, or could see themselves doing this. Only a few children (N=2) mentioned meat substitutes when asked what a meat replacer was. All the other children either did not know a definition or mentioned meat analogues. Not seeing the meat substitute as a meat replacer led to a lower liking of a vegetarian dish with a meat substitute, where most children that did see a meat substitute as a meat replacer preferred the meat substitute over meat.

One child liked the fact that there were a lot of different meat analogues to choose from, so he or she thought there would always be tasty ones. Another child thought there were more sorts of meat substitutes than there were different meat analogues to choose from. He or she liked this as he or she thought this would increase the chance of finding ones that he or she would like.

5.5.7 Schematic representation of the results

The aforementioned factors influence the perception of children towards a vegetarian supper containing a meat analogue, a meat substitute, or neither a meat analogue nor a meat substitute. This is summarized in Figure 4, where a schematic representation of the results of the current study is presented.

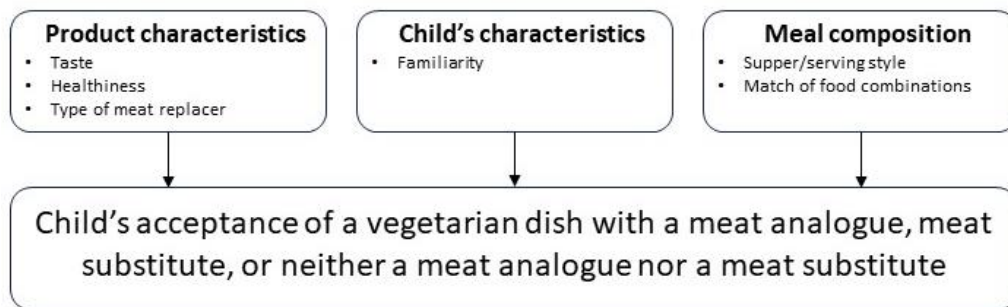


Figure 4: Schematic representation of factors influencing children's perception of a vegetarian supper with a meat analogue, meat substitute, or no meat replacer

6 Discussion and conclusion

The current study focused on the perception of 7- to 11-year-old Dutch children towards vegetarian suppers in which the meat is replaced by either a meat analogue, a meat substitute, or simply left out. Data was gathered by having children keep track of a food journals during a week, letting children construct a vegetarian meal using pictures, and conducting one-to-one in-depth interviews with the children.

It was found that children's perception of the three types of vegetarian supper was determined by their familiarity with the types of food, the food's taste, healthiness, and the composition of the meal. The following sections discuss the role played by the above-mentioned factors in children's perception of a vegetarian supper containing a meat analogue, meat substitute or neither of those. Next, a discussion is provided focusing on the implications of the current study as well as recommendations for future research.

6.1 Perception of a vegetarian supper

According to the current study, children found taste, familiarity with foods, and health to be the most important aspects of supper. Children were found to like food better when they were more familiar with the food, when the food tasted good, and when it was healthy. Taste was found to be the main factor of these three, which is in line with previous findings (Da Quinta et al., 2021; Chow et al., 2022). Children stated that they liked food more when they ate it more often, explaining the effects that were found for familiar foods as opposed to food types they were unfamiliar with. Similar results were found by Wardle et al. (2003) where children's liking of a previously disliked vegetable increased after repeated consumption. The healthiness of foods was seen as less important but still played a role in children's food preferences, which is in line with earlier research by Sick et al. (2019).

Most of children's perceptions were positive towards a meal with a meat analogue. This can be explained by the fact that most of the children liked the taste of (various) meat analogues and they tend to choose their food based on what they like (Da Quinta et al., 2021). Also, most of the children were familiar with meat analogues and familiarity tends to lead to a higher liking (Wardle et al., 2003; Patrick & Nicklas, 2005). Even some children who were unfamiliar with meat analogues had positive perception of meals containing meat analogues. A study by Harris (2008) shows that some children have a high willingness to try novel foods, which explains why sometimes familiarity does not matter. The current study found that only a small number of children indicated that the healthiness of a dish with a meat analogue played a role in their likeability of it, even though children did state health to be an important aspect of supper. This finding could perhaps be explained by the rather young age of the children participating in this study, as earlier research (Tarabashkina et al., 2016) found that young-aged children still lack nutritional knowledge of foods. Another explanation for why children did see health as an important aspect of dinner, but not specifically in a dish could be the intention behaviour gap that might appear when one looks specifically at a dish instead of supper in general. Contrary to earlier findings (Pater et al., 2022), this study found that meat analogues did not have to resemble real meat in taste but should just be a tasty product itself. This can again be explained given that taste is the most important factor determining which foods children like, and that in the current study, children stated that not all meals need meat (or a meat-like taste). Another explanation could be that the current study focused on meat analogues in a meal context, where the study by Pater et al. (2022) solely focused on the meat analogue itself.

It was found that children were generally okay with a vegetarian dish that contained a meat substitute, but were not really enthusiastic about it. Again, taste and familiarity can be used to explain these findings. All of the children were familiar with meat substitutes and, as established in earlier research

(Skinner et al., 2002; Wardle et al., 2003), familiarity with foods leads to a higher acceptance and likeability of foods. According to the current study, several children did not like the taste of meat substitutes. This is in line with research done by Onwezen et al. (2022), who also stated that the taste of meat substitutes was a barrier to their acceptance. As indicated by earlier studies (Da Quinta et al., 2021; Chow et al., 2022), taste is a more important factor than familiarity, which explains why in the current study it was found that vegetarian dishes with meat analogues were more liked by children than vegetarian dishes with meat substitutes. The preference for a dish with a meat analogue compared to a meat substitute is contrary to earlier findings (Elzerman et al., 2021). An explanation for this difference could be that in the current study, the sample consisted of children, whereas in the other research, adults were studied. Besides that, the level of the samples' familiarity with meat analogues differed, as this was rather low in earlier research and higher in the current study.

The current study also showed that children mostly did not see a meat substitute as a meat replacer. According to research from Elzerman et al. (2011), this could lead to a lower acceptance of meat substitutes. As was the case with the meat analogue dish, healthiness did not play a big role in children's perception of a vegetarian dish with a meat substitute. This can again be explained by their lack of nutritional knowledge (Tarabashkina et al., 2016), or the intention behaviour gap.

Children were generally neutral or positive towards a vegetarian dish containing neither a meat analogue nor a meat substitute. The results of the current study showed that the children preferred a dish with no meat replacer over a dish with a meat substitute, but less than a dish with a meat analogue. The most likely explanation for this is the importance of taste, as taste is the most important factor in children's food choices (Rose et al., 2004b; Blanchette and Brug, 2005). The current study found that children were generally positive towards the taste of meat analogues and disliked the taste of meat substitutes. Children's likeability of a vegetarian dish without a meat analogue or a meat substitute is thus expected to lie between the two other options (a vegetarian dish with either a meat analogue or a meat substitute).

6.2 Importance of meal composition

This study found that the composition of a meal was an important factor in the preference children had towards a vegetarian supper containing a meat analogue, meat substitute, or neither a meat analogue nor a meat substitute. Earlier studies (Nielson et al., 2018; Kildegaard et al., 2011) found that colour combinations and serving styles (mixed or separated) influenced eating behaviour. The current study showed that this meal composition also affected children's food preferences. The finding that meat analogues did not have to resemble regular meat is an example of this. When a meat analogue is seen in the context of a meal, it might be less important to children that meat analogues resemble real meat than when focused on the meat analogue itself, as was found by Pater et al. (2020). This can be explained by the fact that, in the case of the meal context, more dominant or important other flavours/ingredients are present. Furthermore, it was found that the meal composition and serving style influenced the preferred meat replacer children had for a dish. In this study, children explained this by saying that the taste of the meat replacer should go well with the other components of the dish. This is a reasonable explanation as, again, taste is the most important factor for children's food preferences (Rose et al., 2004b; Blanchette and Brug, 2005). Earlier studies (Olsen et al., 2005; Elzerman et al., 2021) showed that serving certain foods with others could increase the intake of one of them. This could also explain the importance of meal composition to children. To the knowledge of the researcher, no earlier studies have shown the importance of meal composition in the preferences children have for the choice of a meat replacer.

6.3 Consideration for future research

Some limitations of the current research should be mentioned. Due to time limitations, only children from around the same area in the Netherlands participated in the current study. This could have led to a less diverse sample with regards to socio-economic background than would be representative for the Dutch child population. A difference in the socio-economic background of (parents of) children could affect the results, as children from well-educated parents are familiar with a higher variety of types of foods (Mustonen et al., 2012). Future research could aim at obtaining a more representative sample by including children with a different socio-economic background located across different places in the country.

Even though earlier studies stated that the use of pictures provides reliable information on children's food preferences (Kildegaard et al., 2011), children sometimes found it hard to assess the likeability of dishes of which pictures were presented during the interview. Future research could make use of methods in which children can actually try the dishes in order for them to be better able to explain themselves why they do and do not like certain (aspects of) dishes.

The current study consisted of three components that yielded data. Besides one-to-one in-depth interviews, picture collages were made and food journals were kept by the children. As earlier research stated (Coyne et al., 2021; Clark, 2010), using these methods that are fitted to the strengths of children and letting them participate in their own way resulted in a more diverse and thorough yield of data. This is why future research could consider making use of multiple methods to collect data when studying children's food preferences.

The results from the current study indicate a difference in children's preferences regarding the various types of vegetarian supper. Even though the sample size of this study is too small to deliver statistically significant evidence for these differences, the results show that the methodology of the current study is suitable for future research. Examples are the ratings children gave to the dishes in their food journals and the choices they made in their picture collages. When this is performed on a larger scale, statistical tests can be conducted to quantitatively search for relationships and differences between important aspects of the vegetarian supper and children's perception of it.

6.4 Research implications

The results of the current study can be used as a basis for research on children's food preferences regarding vegetarian dishes. It was found that children mostly evaluate their foods based on taste. Familiarity with the foods is also important, but children are also open to trying new foods, which is in line with previous findings (Wardle et al., 2003; Patrick & Nicklas, 2005; Harris, 2008). Furthermore, the results of the current study show that the methodology used could be applicable to future research in order to find possible correlations between important factors of vegetarian supper and children's preferences for a vegetarian supper containing either a meat analogue, a meat substitute, or no meat replacer. When more extensive research is performed on the subject, the consumption of vegetarian supper among children can be positively affected, which is expected to help enable the transition towards a vegetarian diet.

Currently, consumer research on food products often solely focuses on the consumer's perception of the individual food product rather than on the product in the context of a dish. The results of this study indicate that the meal composition could possibly affect children's preferences for the use of a meat substitute, meat analogue, or no meat replacer. It is therefore advised that when conducting research on children's food perception, the composition of the meal is included in the study. The insights of this study are a first step in understanding and influencing children's vegetarian eating habits and contributing to the shift towards a more vegetarian diet.

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Appendix II: Relevant article information categorised

Table 10: Extracted data from articles categorised per research question

Name of the article	Author	RQ1	RQ2	RQ3	RQ4
A review of family and social determinants of children's eating patterns and diet quality	Patrick and Nicklas (2005)	<ul style="list-style-type: none"> • children do not eat food they don't like • liking is affected by repeated exposure as children tend to dis-like unknown foods • companionship is of positive influence on meal perception • Feeding style is of influence on what children want to eat (permissive-->actually want it) • Ethnicity and cultural background is of influence on food preferences 			
Factors influencing children's food choice	Hursti (1999)	<ul style="list-style-type: none"> • Cultural background is of importance in food preferences • accept or reject food on perceived taste • choose food based on likes and dislikes • good taste of importance in liking • children that eat with older children tend to like what the other child eats • being familiar with food leads to liking • using food as a reward increases preference for that food • using food as means decreases preference 			
Familiarity with and affective responses to foods in 8-11-year-old children. The role of food neophobia and	Mustone et al. (2012)	<ul style="list-style-type: none"> • high level of food neophobia leads to lower pleasantness of food • children of well-educated parents develop less food neophobia due to being more familiar with more kinds of food 			

parental education					
Development of taste and food preferences in children	Harris (2008)	<ul style="list-style-type: none"> • willingness to accept new foods in highly genetically determined 			
Developmental and environmental influences on young children's vegetable preferences and consumption.	Johnson (2016)	<ul style="list-style-type: none"> •Children are known to prefer higher intensities of salt and sugar than adults •Children's genetics are of influence on their food preferences • It has been shown that the addition of energy to increase energy-density increases the food preference 			
Infants' and Children's salt Taste Perception and Liking: a review	Liem (2017)	<ul style="list-style-type: none"> •Children prefer higher levels of salt in food compared to adults, In a study with 8- to 11-year-old it was found that small additions of salt would increase liking of pasta 			
The development of sweet taste: From biology to hedonics	Mennella et al. (2016)	<ul style="list-style-type: none"> •Children prefer a higher level of sweetness compared to adults •the level of sweetness preferred depends on the food product • An increased consumption is seen of a sweetened product (vegetables) 			
Increasing children's acceptance of vegetables; a randomized trial of parent-led exposure	Wardle et al. (2003)	<ul style="list-style-type: none"> • An increase in exposure will increase the liking and consumption of that specific product 			

Children's food preferences	Skinner et al. (2002)	<ul style="list-style-type: none"> • Children's preference for a food increases with repeated exposure • environmental influences such as peers and school influence the food preferences of children • Mother's food preference is of great influence on children's food preference 			
Determinants of fruit and vegetable consumption among 6-12-year-old children and effective interventions to increase consumption	Blanchette and Brug (2005)	<ul style="list-style-type: none"> • Taste preference is very important in what children like to eat • Children have an innate preference for sweet and salty, and dislike bitter and sour • Children prefer the taste of energy-dense food 			
Reasons for Rejection of Food Items in Swedish Families with Children Aged 2–17	Koivisto and Sjödén (1996)	<ul style="list-style-type: none"> • The main reason for children to reject food is dis-liking the taste • The main reason for children to accept food is liking the taste • Reasons children provided for not liking a food are: too little or too much intensity, too sour, unpleasant/too hard texture, not-knowing the food. • Reasons for liking are: good taste (sweet), easy to eat, nice appearance • for children aged 9-11, taste was most important followed by texture • Children aged 8-10 years have a preference for sweet, salt, and sour and have an aversion against bitter • They also have a preference for energy-dense products 			

<p>The perception of 8- to 10-year-old Dutch children towards plant-based meat analogues</p>	<p>Pater et al. (2022)</p>		<ul style="list-style-type: none"> • Children perceive meat analogues to be healthy, effected by vegetable and fat content • Meat analogues should resemble meat in colour/appearance, in texture, and in taste • empathy with animals contributes to positivity on meat analogues 		
<p>Predictors of children's food selection: The role of children's perceptions of the health and taste of foods</p>	<p>Nguyen et al. (2015)</p>	<ul style="list-style-type: none"> • For children, taste is of a bigger influence on food selection than perceived health 			
<p>Sensory profiling by children aged 6–7 and 10–11 years. Part 1: a descriptor approach</p>	<p>Rose et al. (2004a)</p>	<ul style="list-style-type: none"> • Research shows a difference in taste preference and perceived levels of sweetness between adults and children • Sense of taste is still in development during childhood • chewing ability of taste is different for children than adults, resulting in difference in perceived texture and release of flavour • mouthfeel, smell, and taste are important in the liking of a product 			
<p>Sensory profiling by children aged 6–7 and 10–11 years. Part 2: a modality approach.</p>	<p>Rose et al. (2004b)</p>	<ul style="list-style-type: none"> • The six main sensory modalities that may influence liking of a product are appearance, smell, taste, texture/mouthfeel, aftertaste, and afterfeel • Taste and texture are 			

		the most important factors in product liking			
Determining children's perceptions, opinions and attitudes for sliced sandwich breads	Jervis et al. (2014)	<ul style="list-style-type: none"> •With bread, children prefer a light-coloured crust 			
Children's acceptability profiles for biscuits with different fibre content	Da Quinta et al. (2021)	<ul style="list-style-type: none"> • Children's food consumption is driven by hedonic factors • texture is an important factor in the likeability of food 			
A review on children's oral texture perception and preferences in foods	Chow et al. (2022)	<ul style="list-style-type: none"> •Texture properties of foods are important for food acceptance and rejection in children •Cultural background plays a role in texture preferences •Mechanical textural parameters such as hardness, cohesiveness, crispness, and crunchiness have a strong influence on the acceptability of categories of solid and semi-solid foods like vegetables, cereals, confectionary, dairy products and meat •More research is needed to develop a more coherent view on acceptable ranges of mechanical properties of foods in relation to children's food acceptance. •In meat product, children like chewy textures 			

<p>Children's Self-Reported Reasons for Accepting and Rejecting Foods</p>	<p>Sick et al. (2019)</p>	<ul style="list-style-type: none"> •Taste and texture are important factors in children's food liking •Sensorial properties are one of the most influencing factors in eating behaviour with good taste, smell, appearance and texture being the most important ones •There are conflicting results in researches about the effect of gender on food preferences •Good taste and curiosity are seen as important reasons to accept foods, appearance, smell, texture, and health are less common reasons •Bad taste, smell, appearance, and texture are important reasons in food rejection 			
<p>Serving style preferences for various meal arrangements among children</p>	<p>Nielson et al. (2018)</p>	<ul style="list-style-type: none"> •Serving styles of foods and meals, such as colour combination and the amount of food presented, can influence children's eating behaviour •Visual presentation, such as the shape of a food item, is an important factor for children •Whether or not there are gender effects on food preferences is not clear from literature •Three supper styles, separated, mixed, and in-between, were tested. Difference in children's liking was observed •A significant difference between the younger and the older age groups preferences of preferred serving styles was found 			
<p>Do children favor snacks</p>	<p>Ragelienė (2021)</p>	<ul style="list-style-type: none"> •Children's food preferences are 			

and dislike vegetables? Exploring children's food preferences using drawing as a projective technique. A cross-cultural study		influenced by many psychosocial factors including peers, marketing, emotions, or personality factors			
Dish composition: children's mental representation and expected liking	Olsen et al. (2015)	<ul style="list-style-type: none"> •Serving a liked vegetable with an neutral-preferred product increases children's consumption of the latter •Serving familiar food with unfamiliar ones, increases the children's willingness to consume the latter •Adding carrots to a salmon dish increased the overall liking of the dish, adding it to meatballs decreased the overall liking 			
A method to measure the effect of food appearance factors on children's visual preferences.	Kildegaard et al. (2011)	<ul style="list-style-type: none"> •Appearance properties of a meal include, among others, colour, size and shape •The overall appearance of food is essential in accepting or rejecting it 			
Appropriateness, acceptance and sensory preferences based on visual information: A web-based survey on meat substitutes in a meal context	Elzerman et al. (2015)	<ul style="list-style-type: none"> •The appropriateness and acceptance of meat analogues has to do with the meal context 	<ul style="list-style-type: none"> •The appropriateness and acceptance of meat analogues has to do with the meal context 		

Situational appropriateness of meat products, meat substitutes and meat alternatives as perceived by Dutch consumers	Elzerman et al. (2021)	<ul style="list-style-type: none"> •The context in which food products are eaten influences the acceptance •Context includes the social or situational context (i.e. where, when, how, with whom the food is eaten) or the meal context (i.e. which other foods accompany the food product when it is eaten •serving a familiar sauce with a novel food enhanced the willingness to try and the acceptance of the food by adults and children 	<ul style="list-style-type: none"> •The context in which food products are eaten influences the acceptance •When wanting a healthy meal, meat analogues were seen as more appropriate than meat products 	<ul style="list-style-type: none"> •The context in which food products are eaten influences the acceptance •The use of meat substitutes was generally seen to be more appropriate than the use of meat analogues 	
Consumer acceptance and appropriateness of meat substitutes in a meal context	Elzerman et al. (2011)	<ul style="list-style-type: none"> •smaller meat substitutes that will be served as part of a dish (e.g. in a soup, a sauce, or as a topping on a pizza), seems to be more acceptable. Since these 'meat substitute ingredients' are not eaten separately, but always as part of a dish, the meal context seems to be of crucial importance for the acceptance of these meat substitutes. •the match of a food combination was in large part independent of preferences for the individual components 	<ul style="list-style-type: none"> •Appropriateness seemed to be influenced by the appearance of the meat substitute-meal combination, and less by flavour and texture. •One prerequisite for the acceptance of meat substitutes is that consumers can recognize a meat substitute as being a product that should be eaten instead of meat. •smaller meat substitutes that will be served as part of a dish (e.g. in a soup, a sauce, or as a topping on a pizza), seems to be more acceptable •In some meals, the other ingredients mask 	<ul style="list-style-type: none"> •One prerequisite for the acceptance of meat substitutes is that consumers can recognize a meat substitute as being a product that should be eaten instead of meat. 	

			<p>the flavour and texture of the meat analogues to a certain extent, making the use of it suitable.</p> <ul style="list-style-type: none"> •Meal context influences liking of meat analogues 		
Replacement of meat by meat substitutes. A survey on person- and product-related factors in consumer acceptance	Hoek et al. (2011)		<ul style="list-style-type: none"> • Lower sensory attractiveness of meat analogues leads compared to meat leads to a low acceptability. It is a key barrier. 		
Children's food choice process in the home environment. A qualitative descriptive study	Holsten et al. (2012)	<ul style="list-style-type: none"> • Degree of hunger plays a role in children's food choice • Time context, eating times as well as time pressure, time of the day and time of the year, plays a role in children's food choice •Children's food choices are dependent on the presence of a parent 			

<p>A systematic review on consumer acceptance of alternative proteins: Pulses, algae, insects, plant-based meat alternatives, and cultured meat</p>	<p>Onwezen et al. (2021)</p>			<ul style="list-style-type: none"> •Product related motives or barriers to accept pulses as meat substitutes are: health, taste, environment , weight control, reflection oriented motives, variety, versatility, perceived benefits, flatulence, preparation difficulty, and viewing pulses as food for vegetarians, time needed to prepare, a lack of knowledge of how to prepare legumes or incorporate them in meals and legume distaste. •Psychologic al factors for the acceptance of pulses as meat substitutes are: attitudes •External attributes for the acceptance 	
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				of pulses as meat substitutes are: social environment , family preferences	
Stress, emotional eating behaviour and dietary patterns in children	Michels et al. (2012)	<ul style="list-style-type: none"> • stress was associated with emotional eating and a more unhealthy dietary pattern and could thus contribute to the development of overweight, also in children. Positive associations were observed between problems and both sweet and fatty foods consumption 			

Appendix III: Assumption tables

Table 11: Assumptions RQ1

Crucial feature	Author	Information article	Assumption
like and dislike	Patrick and Nicklas (2005)	children do not eat food they don't like	Children choose food based on what they like and don't like
	Hursti (1999)	choose food based on likes and dislikes	
	Da Quinta et al. (2021)	Children's food consumption is driven by hedonic factors	
	Koivisto and Sjödé n (1996)	The main reason for children to reject food is dis-liking the taste	Multiple product characteristics factors determine whether children accept a specific food or not. Most studies mention taste to be the most important one followed by texture. Smell and appearance are also mentioned, but to a lesser extent.
	Koivisto and Sjödé n (1996)	The main reason for children to accept food is liking the taste	
	Nguyen et al. (2015)	For children, taste is of a bigger influence on food selection than perceived health	
	Rose et al. (2004 a)	mouthfeel, smell, and taste are important in the liking of a product	
	Koivisto and Sjödé n (1996)	for children aged 9-11, taste was most important followed by texture	
	Rose et al. (2004 b)	Taste and texture are the most important factors in product liking	
	Chow et al. (2022)	Texture properties of foods are important for food	

		acceptance and rejection in children	
	Sick et al. (2019)	Taste and texture are important factors in children's food liking	
	Sick et al. (2019)	Bad taste, smell, appearance, and texture are important reasons in food rejection	
Familiarity	Patrick and Nicklas (2005)	liking is affected by repeated exposure as children tend to dis-like unknown foods	Several studies mention an increase in exposure leads to an increase in the liking and consumption of that specific food. This indicates that familiarity with foods leads to liking. Studies indeed show that children tend to like familiar foods and dis-like unknown ones. One study even showed that serving a familiar food product, in that case a sauce, together with an unfamiliar one actually enhanced the acceptance and willingness to try of the novel food.
	Hursti (1999)	being familiar with food leads to liking	
	Mustonen et al. (2012)	high level of food neophobia leads to lower pleasantness of food	
	Wardle et al. (2003)	An increase in exposure will increase the liking and consumption of that specific product	
	Mustonen et al. (2012)	children of well-educated parents develop less food neophobia due to being more familiar with more kinds of food	
	Olsen et al. (2015)	Serving familiar food with unfamiliar ones, increases the children's willingness to consume the latter	
	Skinner et al. (2002)	Children's preference for a food increases with repeated exposure	
	Elzerman et al. (2021)	serving a familiar sauce with a novel food enhanced the willingness to try and the acceptance of the food by adults and children	

Feeding style	Patrick and Nicklas (2005)	Feeding style is of influence on what children want to eat (permissive- ->actually want it)	The parental feeding style influences the food preferences of children. Forcing them to eat something or using food as a mean for something (you can only watch tv when you finish eating this), decreases children's preference for that food. Using food as a reward, on the other hand tends to increase the preference
	Hursti (1999)	using food as a reward increases preference for that food	
	Hursti (1999)	using food as means decreases preference	
Social context	Hursti (1999)	children that eat with older children tend to like what the other child eats	The social context in which food is eaten influences the acceptance and likeability of food products. Studies show that companionship positively influences the meal perception. It is also shown that children affect each other in food acceptance, children that eat with other children tend to like what the older child eats. Besides that, the presence of a parent influences children's food choice.
	Patrick and Nicklas (2005)	companionship is of positive influence on meal perception	
	Holsten et al. (2012)	Children's food choices are dependent on the presence of a parent	
	Elzerman et al. (2021)	The context in which food products are eaten influences the acceptance, context includes the social or situational context (i.e. where, when, how, with whom the food is eaten) or the meal context (i.e. which other foods accompany the food product when it is eaten	
Personal characteristics	Patrick and Nicklas (2005)	Ethnicity and cultural background is of influence on food preferences	Ethnicity and cultural background are of influence on food preferences
	Hursti (1999)	Cultural background is of importance in food preferences	
	Chow et al. (2022)	Cultural background plays a role in texture preferences	

Sick et al. (2019)	There are conflicting results in researches about the effect of gender on food preferences	It is unclear if gender has an influence on food preferences
Nielson et al. (2018)	Whether or not there are gender effects on food preferences is not clear from literature	
Mustonen et al. (2012)	children of well-educated parents develop less food neophobia due to being more familiar with more kinds of food	The socio-economic background of children affect their product preferences
Johnson (2016)	Children's genetics are of influence on their food preferences	Genetics influence product preferences
Harris (2008)	willingness to accept new foods in highly genetically determined	
Sick et al. (2019)	Good taste and curiosity are seen as important reasons to accept foods, appearance, smell, texture, and health are less common reasons	The level of curiosity plays a role in product acceptance
Holstenson et al. (2012)	Degree of hunger plays a role in children's food choice	Amount of hunger influences children's food choices
Nielson et al. (2018)	A significant difference between the younger and the older age groups preferences of preferred serving styles was found	Age is of influence on product preferences
Michels et al. (2012)	Stress and negative emotions lead to emotional feelings, inducing a preference for sweet and fatty foods	Emotions are of influence on food preferences, as negative ones lead to a preference for sweet and fatty foods

	Ragelienė (2021)	Children's food preferences are influenced by many psychosocial factors including peers, marketing, emotions, or personality factors	
Product characteristics	Johnson (2016)	It has been shown that the addition of energy to increase energy-density increases the food preference	Children prefer products that have a higher energy-density
	Koivisto and Sjöden (1996)	They also have a preference for energy-dense products	
	Blanchette and Brug (2005)	Children prefer the taste of energy-dense food	
	Liem (2017)	Children prefer higher levels of salt in food compared to adults, In a study with 8- to 11-year-old it was found that small additions of salt would increase liking of pasta	Multiple sensorial properties are of influence on the product preferences that children have, with taste and texture being the most important ones. Regarding the taste, children tend to like products that are sweet and salt. Bitter is dis-liked and for sour, conflicting results are shown in studies. The flavour-intensity and appearance of the food product also plays a role. Furthermore, the taste of the product should fit with the expected taste, some products should taste sweet and some not for instance.
	Mennella et al. (2016)	Children prefer a higher level of sweetness compared to adults	
	Mennella et al. (2016)	the level of sweetness preferred depends on the food product	
	Hursti (1999)	accept or reject food on perceived taste	
	Hursti (1999)	good taste of importance in liking	
	Johnson (2016)	Children are known to prefer higher intensities of salt and sugar than adults	

Mennella et al. (2016)	An increased consumption is seen of a sweetened product (vegetables)
Blanchette and Brug (2005)	Taste preference is very important in what children like to eat
Blanchette and Brug (2005)	Children have an innate preference for sweet and salty, and dislike bitter and sour
Koivisto and Sjödén (1996)	The main reason for children to reject food is dis-liking the taste
Koivisto and Sjödén (1996)	The main reason for children to accept food is liking the taste
Koivisto and Sjödén (1996)	Reasons children provided for not liking a food are: too little or too much intensity, too sour, unpleasant/too hard texture, not-knowing the food.
Koivisto and Sjödén (1996)	Reasons for liking are: good taste (sweet), easy to eat, nice appearance
Koivisto and Sjödén (1996)	for children aged 9-11, taste was most important followed by texture
Koivisto and Sjödén (1996)	Children aged 8-10 years have a preference for sweet, salt, and sour and have an aversion against bitter
Rose et al.	The six main sensory modalities that may influence liking of a

(2004 b)	product are appearance, smell, taste, texture/mouthfeel, aftertaste, and after feel
Rose et al. (2004 b)	Taste and texture are the most important factors in product liking
Jervis et al. (2014)	With bread, children prefer a light-coloured crust
Da Quint a et al. (2021)	texture is an important factor in the likeability of food
Chow et al. (2022)	Texture properties of foods are important for food acceptance and rejection in children
Nielso n et al. (2018)	Visual presentation, such as the shape of a food item, is an important factor for children
Chow et al. (2022)	Mechanical textural parameters such as hardness, cohesiveness, crispness, and crunchiness have a strong influence on the acceptability
Sick et al. (2019)	Taste and texture are important factors in children's food liking
Sick et al. (2019)	Sensorial properties are one of the most influencing factors in eating behaviour with good taste, smell, appearance and texture being the most important ones

	Sick et al. (2019)	Good taste and curiosity are seen as important reasons to accept foods, appearance, smell, texture, and health are less common reasons	
Meal context	Nielson et al. (2018)	Serving styles of foods and meals, such as colour combination and the amount of food presented, can influence children's eating behaviour	The serving style of food, mixed, in-between, and separated, is of effect on the food preferences
	Nielson et al. (2018)	Three supper styles, separated, mixed, and in-between, were tested. Difference in children's liking was observed	
	Olsen et al. (2015)	Serving a liked vegetable with an neutral-preferred food increases children's consumption of the latter	The combinations of food that are made in a a dish affect the preferences for that dish. Adding familiar components to unfamiliar ones increases children's consumption of the latter. Also, the different food products should match with each other.
	Olsen et al. (2015)	Serving familiar food with unfamiliar ones, increases the children's willingness to consume the latter	
	Elzerman et al. (2011)	the match of a food combination was in large part independent of preferences for the individual components	
	Olsen et al. (2015)	Adding carrots to a salmon dish increased the overall liking of the dish, adding it to meatballs decreased the overall liking	

	Kildeg aard et al. (2011)	Appearance properties of a meal include, among others, colour, size and shape, the overall appearance of food is essential in accepting or rejecting it	The appearance of the overall dish effects the food preferences
	Elzer man et al. (2015)	The appropriateness and acceptance of meat analogues has to do with the meal context	Meal context influences the food preferences
	Elzer man et al. (2011)	The context in which food products are eaten influences the acceptance, context includes the social or situational context (i.e. where, when, how, with whom the food is eaten) or the meal context (i.e. which other foods accompany the food product when it is eaten	
	Elzer man et al. (2011)	smaller meat substitutes that will be served as part of a dish (e.g. in a soup, a sauce, or as a topping on a pizza), seems to be more acceptable. Since these 'meat substitute ingredients' are not eaten separately, but always as part of a dish, the meal context seems to be of crucial importance for the acceptance of these meat substitutes.	
Time cont ext	Holste n et al. (2012)	Eating times as well as time pressure, time of the day and time of the year,	

		plays a role in children's food choice	
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Table 12: Assumptions RQ2

Crucial feature	Author	Information article	Assumption
Health	Pater et al. (2022)	Children perceive meat analogues to be healthy, effected by vegetable and fat content	Meat analogues are seen as healthy products
	Elzerman et al. (2021)	When wanting a healthy meal, meat analogues were seen as more appropriate than meat products	
Product characteristics	Pater et al. (2022)	Meat analogues should resemble meat in colour/appearance, in texture, and in taste	Meat analogues should resemble meat in colour, texture, and taste. Currently, meat has a higher sensory attractiveness, which is a key barrier in the acceptance of meat analogues. The way that they are used/served also affects the acceptance of it.
	Elzerman et al. (2011)	One prerequisite for the acceptance of meat substitutes is that consumers can recognize a meat analogue as being a product that should be eaten instead of meat.	
	Elzerman et al. (2011)	smaller meat substitutes that will be served as part of a dish (e.g. in a soup, a sauce, or as a topping on a pizza), seems to be more acceptable	
	Hoek et al. (2011)	Lower sensory attractiveness of meat analogues leads compared to meat leads to a low acceptability. It is a key barrier.	
Animal Welfare	Pater et al. (2022)	empathy with animals contributes to positivity on meat analogues	Animal welfare is a reason to consume meat analogues
Meal context	Elzerman et al. (2015)	The appropriateness and acceptance of meat analogues has to do with the meal context	Meal context is of influence on the acceptance of meat analogues.
	Elzerman et al. (2021)	The context in which food products are eaten influences the acceptance	
	Elzerman et al. (2011)	Appropriateness seemed to be influenced by the appearance of the meat substitute-meal combination , and less by flavour and texture.	
	Elzerman et al. (2011)	smaller meat substitutes that will be served as part of a dish (e.g. in a soup, a sauce, or as a topping on a pizza), seems to be more acceptable	
	Elzerman et al. (2011)	In some meals, the other ingredients mask the flavour and texture of the meat analogues to a certain extent, making the use of it suitable.	
	Elzerman et al. (2011)	Meal context influences liking of meat analogues	

Table 13: Assumptions RQ3

Crucial feature	Author	Information article	Assumption
Meal context	Elzerman et al. (2021)	The context in which food products are eaten influences the acceptance	Meal context affects the acceptance of meat substitutes
Appropriateness	Elzerman et al. (2021)	The use of meat substitutes was generally seen to be more appropriate than the use of meat analogues	Meat substitutes were found to be more appropriate than meat analogues
Product characteristic	Elzerman et al. (2011)	One prerequisite for the acceptance of meat substitutes is that consumers can recognize a meat substitute as being a product that should be eaten instead of meat.	It should be clear to consumers that meat substitutes are substitutes for meat. Other motives and barriers are health, taste, environment, weight control, reflection oriented motives, variety, versatility, perceived benefits, flatulence, preparation difficulty, and viewing pulses as food for vegetarians, time needed to prepare, a lack of knowledge of how to prepare legumes or incorporate them in meals and legume distaste
	Onwezen et al. (2021)	Product related motives or barriers to accept pulses as meat substitutes are: health, taste, environment, weight control, reflection oriented motives, variety, versatility, perceived benefits, flatulence, preparation difficulty, and viewing pulses as food for vegetarians, time needed to prepare, a lack of knowledge of how to prepare legumes or incorporate them in meals and legume distaste.	
Psychological factors	Onwezen et al. (2021)	Psychological factors for the acceptance of pulses as meat substitutes are: attitudes	Psychological factors for the acceptance of pulses as meat substitutes are: attitudes
External attributes	Onwezen et al. (2021)	External attributes for the acceptance of pulses as meat substitutes are: social environment, family preferences	External attributes for the acceptance of pulses as meat substitutes are: social environment, family preferences

Appendix IV: Interview guide

Introductie

Hoi... hartstikke leuk dat je mee wil doen met mijn onderzoek. We gaan zo samen een gesprekje houden waarbij ik je wat vragen ga stellen. Je kan geen goede of foute antwoorden geven, ik ben alleen maar benieuwd naar jouw mening over verschillende dingen. Ik heb mijn telefoon aan staan zodat ik dit gesprekje op kan nemen, vind je dat goed? Mijn geheugen is namelijk niet zo goed dat ik van iedereen alles kan onthouden dus dan kan ik het later nog een keer terugluisteren. Heb je nog vragen aan mij voordat we gaan beginnen?

Vragen over het avondeten thuis

- In je dagboek zag ik staan dat je wel/niet altijd vlees eet met het avondeten, wat vind je hiervan? Wat eet je meestal als jullie geen vlees eten tijdens het avondeten?
- Wat zou je ervan vinden als jullie 's avonds vegetarisch zouden eten?

Vragen over vleesvervangers

- Weet je wat vleesvervangers zijn? Zou je mij dit uit kunnen leggen?

Vleesvervangers zijn producten die je tijdens het avondeten eet in plaats van vlees

- Eet je weleens vleesvervangers in plaats van vlees? Wat vind je hiervan/wat denk je dat je hiervan zou vinden?

Foto collage

- Zou je me iets kunnen vertellen over het gerecht wat je hebt gemaakt? Wat is het gerecht en waarom heb je bepaalde ingrediënten wel/niet gekozen?
- In de opdracht kon je kiezen uit allemaal plaatjes, waren er dingen die je graag had willen gebruiken maar niet kon kiezen?

Er zijn twee soorten vleesvervangers. Je hebt vleesvervangers die echt moeten lijken op vlees en dus een soort namaak-vlees zijn, maar je kan ook peulvruchten gebruiken als vleesvervangers.

Peulvruchten zijn groentes zoals doperwten, linzen, boontjes, peultjes, en bonen.

- In jouw collage heb je wel/niet gekozen voor vleesvervangers, waarom heb je deze keuze gemaakt?

Perceptie van gerechten uit Figure 2

Ik heb hier afbeeldingen van vijf gerechten: een vrij standaard gerecht met groenten en aardappels, spaghetti Bolognese, een wok gerecht met rijst, een wrap, en pasta salade.

- Welk van deze gerechten zou je het liefst willen eten. Waarom?

Dit is een vegetarisch gerecht dat dat namaak-vlees/peulvruchten/geen van beide bevat.

- Zou je dit gerecht eten in plaats van gerechten die wel echt vlees bevatten? Waarom wel/niet?
- Welk van deze gerechten zou je het minst lief willen eten? Waarom?

Perceptie van het hiervoor gekozen gerecht gemaakt op de 3 vegetarische stijlen.

Dit gerecht kan op 3 verschillende vegetarische manieren worden gemaakt. Je kan het maken met namaak-vlees, met peulvruchten, of je laat het vlees gewoon weg (Laat 3 blaadjes zien waar de opties op staan).

- Wat vind je van de optie met het namaak-vlees? Welk soort namaak-vlees zou je dan kiezen?
- Wat vind je van de optie met de peulvruchten? Welk soort peulvruchten zou je dan kiezen?
- Wat vind je van de optie waarbij het vlees wordt weggelaten?
- Welk van deze opties zou je het liefst willen eten en waarom kies je deze boven de anderen?
- Zou je dit gerecht eten in plaats van het gerecht gemaakt met echt vlees? Waarom wel/niet?
- Welk van deze opties zou je het minst lief willen eten? Waarom?

Sluiting

Hartstikke bedankt voor je deelname, dit waren al mijn vragen. Als bedankje heb ik hier een echte hulp-onderzoekersdiploma voor je waar je je handtekening op mag zetten. Zijn er nog dingen die je aan mij wil vragen?

Appendix V: Supper journal

MAANDAG

Dit heb ik gegeten als avondeten:

Dit zat er allemaal in:

Dit vond ik er lekker aan:

Dit vond ik er niet zo lekker aan:

Ik heeft het gerecht dit aantal sterren (5 is het best/lekkerst)



Appendix VI: Pictures used in picture collage



Aardappel



Sojabonen (edamame)



Linzen



Vegetarische spekjes



Tomaat



Ui



Noedels



Komkommer



Vegetarisch gehakt



Vegetarische schnitzel



Broccoli



Spaghetti



Kikkererwten



Champignon



Vegetarische shoarma



Paprika



Witte bonen



Bruine bonen



Peultjes



Rijst



Sla



Couscous



Sperziebonen



Vegetarische kipstukjes



Bloemkool



Aubergine



Kidneybonen



Vegetarische hamburger



Boerenkool



Macaroni



Spinazie



Andijvie



Vegetarische worstjes



Wortel



Mais



Prei



Courgette



Zoete aardappel

Naam:

Naam gerecht:

Dit vind ik het meest lekkere/belangrijke ingrediënt:

