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Don’t Judge the Food by Its Plate?

A mixed-method study: associations with plate material and how this influences food evaluation

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Abstract

This thesis explored how plate material influences perceived food palatability through the underlying mechanism of automatic association. This study used a sequential mixed-methods design, Study 1 involved qualitative interviews to identify associations consumers hold with disposable (plastic, paper) versus permanent (ceramic) plates. Results showed that associations participants hold with disposable plates compared to permanent plates influences the evaluation of the food negatively. These insights informed Study 2, a quantitative survey-experiment (N = 172) was conducted in which participants evaluated pasta and cake served on different plate materials. Results showed that ceramic plates led to significantly higher perceived food palatability compared to plastic plates. Mediation analyses revealed that this effect was explained by increased sensory appeal, food pleasure, perceived food quality, and purchase intention. Health perception did not mediate the relationship. Although qualitative data suggested that the congruence between food type and plate material influences expectations, no significant moderation by food type (cake vs. pasta) was found in the experiment. These findings highlight the role of material cues in shaping food evaluation and suggest that plate material can influence consumption behaviour through automatic associations. The study contributes to theories of associative networks, sensation transference, and dual-process decision-making, with practical implications for sustainability policy and food waste interventions.

Content

Introduction

We live in a world where around 40 percent of all food produced never reaches our mouths (WWF-UK, 2021). Food waste has become a significant global problem and continues to rise. Every meal we eat leaves more than just crumbs on our plate. It leaves behind an entire trail of waste including water, energy, and labour, which contributes to environmental degradation, economic inefficiencies, social consequences and ethical concerns about resource distribution (Dey et al., 2024). Paradoxically, more than one-third of what we produce goes wasted while at the same time, hundreds of million people suffer from hunger each year (UNEP, 2024). Within Europe alone, 88 million tonnes of food are wasted annually which is valued around 143 billion euros (EPRS, 2020). This accounts for 8-10 percent of global greenhouse gas emissions (FAO, 2013).

Plate waste in the food service industry

One major contributor to food waste is the food service industry. They have a critical role in the global food waste challenge, as it serves billions of meals annually and now employs more people than any other retail business (Martin-Rios et al., 2018). According to Fieschi and Pretato (2018), 12 percent of the global food waste is estimated to arise from food service industry.

Studies have identified customer leftovers – what remains uneaten on the plate – as a main source of food waste in restaurants (Pirani & Arafat, 2016; Principato et al., 2021). One United Kingdom (UK) study tries to quantify where in the food service system – preparation, spoilage, customer – food waste arises (WRAP, 2013). It showed that within the hospitality and food service sector the plate waste was highest in basic dining (46%) and lowest in fine dining (23%) settings, and the average mean across kitchen types was 34 percent (Zhao & Manning, 2019). Such waste is avoidable; estimates suggest 94% of plate waste could be prevented (Papargyropoulou et al., 2016).

The role of out-of-home dining in plate waste

Over the past decades, there is a societal shift in dining practices, with a significant increase in out-of-home eating (Dybka-Stępień et al., 2021; Naska et al., 2015). This shift has led to a significant rise in out-of-home food waste (Principato et al., 2021). Households in the European Union (EU) now spend over 600 billion euros annually on catering services, with the COVID-19 pandemic playing a significant role in the increase of takeaway orders (Dybka-Stępień et al., 2021).

Parallel to the rise in out-of-home dining is the growing use of disposable tableware which has gained importance within the foodservice industry as it is convenient. The European disposable tableware market was valued at approximately 4.6 billion euros in 2024, and is expected to grow at an annual growth rate of four percent from 2024 to 2031 (Mali, 2024). According to Gill et al. (2020), the food service industry is a major contributor to the use of disposable dinnerware, which sees a significant peak during the summer months, particularly during picnics, barbecues, and events like music and food-truck festivals (Dybka-Stępień et al., 2021).

The disposable tableware market

According to the disposable tableware market report of Mali (2024), this market has grown significantly due to rising demand for convenience, increasing hygiene awareness, and the expansion of the foodservice sector, which aligns with the rise in out-of-home eating. Moreover, busy lifestyles, urbanisation, and the increasing number of single-person households have made single-use tableware a practical and affordable choice for homes, outdoor events, on-the-go dining, and the foodservice industry. The COVID-19 pandemic further strengthen this trend, as consumers prioritised single-use products to reduce virus transmission. While the pandemic has ended, hygiene and safety remain top priorities, particularly in the food service sector, which supports the demand for disposable tableware. In short, as urbanisation and lifestyle changes continue, alongside the enduring focus on hygiene, the disposable tableware market is expected to maintain its growth (Mali, 2024).

The European Union's 2021 ban on single-use plastics (EC, 2019) has transformed the disposable tableware landscape. There is a transition from plastic to biodegradable alternatives, to align with the rising trend of "eco-awareness" (Dybka-Stępień et al., 2021). While reducing plastic seems like a step in the right direction, the broader impacts of this transition, particularly the indirect and unintended effects, remains unexplored. For instance, although the reduction of plastic use may benefit the environment, it is still unclear how this policy impacts consumer behaviour. Research suggests that the material of plateware, such as the use of disposable versus permanent plates, can significantly influence food waste behaviour (Williamson et al., 2016).

This transition may unintentionally result in a lose-lose situations. While moving away from plastic use is an important environmental goal (EU regulations), industries such as the food service industry often opt for disposable alternatives rather than permanent alternatives (Polle, 2024). However, research suggests that people rate sensory qualities lower when using biodegradable dishware compared to plastic or permanent alternatives (Torkelsen, 2023; Wei En Lim & Kay Chai Tay, 2024). This diminished evaluation of sensory qualities may unintentionally influence food-related behaviour, which can potentially lead to an increase in food waste. Although the transition is driven by well-intended sustainability efforts, it may ultimately fail to achieve its intended goals. Further research is needed to explore whether this shift is genuinely beneficial or if it introduces new sustainability challenges.

Factors influencing plate waste

The European Commission identified "standardised portion sizes in restaurants and canteens" as a contributing factor to avoidable food waste (Lorenz et al., 2017). However, linking plate waste solely to portion sizes overlooks the complexity of consumer behaviour. According to Lorenz et al. (2017), food choice and eating behaviour are influenced by a wide range of factors including personal, situational and social elements. For instance, social contexts such as the presence of others during meals have been shown to affect consumption behaviours, with a study that found that females tend to reduce their food intake when dining in the presence of others (Young et al., 2009).

However, within these studies on specific determinants for food-related behaviour, the impact of palatability of food on food consumption has been a key focus in studies. Palatability is frequently identified as one of the greatest drivers of food-related behaviours (Lorenz et al., 2017). Yeomans (1998) describes palatability as the sensory appeal of food, including taste, texture, aroma, and overall acceptability, which can influence an individual's willingness to eat it. It is a subjective experience and often shaped by personal preferences, cultural norms, and prior experiences with the food.

Plate attributes

Taste perception is not only influenced by the attributes of the food itself but also by environmental and contextual factors. Contextual factors including cutlery or tableware, the atmosphere, and packaging have all been shown to influence the perceptual experience (Stewart & Goss, 2013). Emerging research highlights the significant role of non-consumable elements, such as tableware, in shaping consumer perceptions and behaviours. Plates in particular are influential as food-extrinsic factors. They possess various attributes than can directly impact the sensory and psychological evaluation of food (Wei En Lim & Kay Chai Tay, 2024). For example, plate colour and texture have been found to affect taste perception, with colour influencing the perceived sweetness and plate texture influencing mouthfeel (Biggs et al., 2016; Piqueras-Fiszman & Spence, 2015). The study of Stewart and Goss (2013) also explored the influence on two external factors, plate shape and plate colour, that have the potential to influence ratings of sweetness, intensity, quality and liking.

Plate material

Plate material has been shown to influence food waste, as explored by Williamson et al. (2016), who researched the combined effects of multiple sensory cues using different plate materials. Specifically, their study explored the effect of plate disposability on food waste generation and found that food waste was higher when consumers ate from disposable plates (paper) compared to reusable plates (hard plastic). This study suggest that the effect of plate material on food waste is largely shaped by consumers' accumulated experiences with these materials and their associated dining contexts. This phenomenon can be partly explained by sensation transference – a psychological mechanism where perceptions of food-extrinsic attributes, such as plate material, carry over to perceptions of the food itself (Wei En Lim & Kay Chai Tay, 2024).

Research in cognitive neuroscience provides insights in why such sensation transference effects may occur, which offers an explanation rooted in the concept of cross-modal correspondences (Spence, 2011). This concept suggests that we hold associations between sensory attributes – whether perceived or imagined – across different sensory modalities. These correspondences can shape consumer expectations and behaviours, often unconsciously. For instance, angular shapes in food packaging can trigger expectations about the sensory qualities of the product inside, which may influence consumption decisions (Spence, 2011). Similarly, the material and disposability of plates may trigger automatic

associations related to casualness, convenience, or wastefulness, thereby influencing consumption and waste behaviour.

Relevance

In conclusion, the issue of food waste in the foodservice industry requires a deeper understanding of how subtle factors in our environment can influence behaviour. While much is known about individual and situation factors influencing food waste (Zhao & Manning, 2019), including aspects such as portion size, visual cues, and food presentation (Marchiori et al., 2014; Wansink & Ittersum, 2013), less is known about how plate material may affect food palatability, which can in turn influence food waste behaviour. Palatability, as a subjective evaluation of how enjoyable or appetising food is, has been identified as a major driver of consumption behaviour (Yeomans, 1998; Lorenz et al., 2017). And although existing literature suggests that the cross-modal correspondence mechanism explains how plate material can influences food-related behaviour (Piqueras-Fiszman et al., 2012), there is less attention given to the specific associations consumers hold with disposable versus permanent plate materials, and whether these association extend to the sensory evaluation of the food itself.

Given the growing market disposable tableware due to expansion of the foodservice industry (Mali, 2024), it is interesting to build on the literature that explores how properties of the materials used can influence perceived food palatability which can provide important insights into consumer food behaviour. Disposable and permanent plates may likely carry contrasting associations, which can affect how people treat and consume food. This gap presents an opportunity to explore how the disposability of materials impacts food palatability and the associations driving these sensory evaluation.

From a scientific perspective, this research can contribute to the understanding of how plate material influences sensory evaluation and in turn food-related behaviours, which adds to existing research on sustainability and consumption habits. While the EU Single-Use Plastics Directive aims to reduce plastic pollution, its unintended effect such as increased food waste remain unexplored, which offers insights into psychological associations with tableware materials and behavioral responses. Societally, these findings can inform policymakers, businesses, and consumers about the broader sustainability impact of this regulation. Moreover, it could inform policy improvements, promote sustainable tableware choices, and support interventions. By encouraging small but meaningful changes in dining settings, this study may help contribute to sustainability goals.

Research question

This study aims to explore the specific associations consumers hold with disposable versus permanent plates and examine whether these associations transfer to the sensory evaluation of the food itself. Additionally, the study seeks to identify the factors that moderate the relationship between plate material and perceived food palatability, thereby addressing a gap in the current literature on the psychological mechanisms behind this influence.

How appealing or enjoyable food is (its palatability) can influence whether people consume it or throw it away (Blondin et al., 2015). Factors such as taste, visual appeal, and overall pleasantness make food more palatable (Yeomans, 1998). Plate attributes, including the material of the plate, can shape these perceptions of palatability (Spence et al., 2012). This research aims to explore how different plate materials evoke specific associations, which may affect the perceived palatability of food.

To research the relationship between plate material and perceived food palatability, the following main research is formulated:

How does plate material influence perceived food palatability?

Understanding consumer associations with plate materials can help determine whether associations related to disposability influence the perceived palatability of the food itself. This leads to the first sub-research question:

SRQ 1: What different associations do consumers have with disposable plates vs. permanent plates?

To better understand the psychological mechanism underlying the relationship between plate material and food perception, it is important to explore not only whether different materials influence perceived food palatability, but also how this effect occurs. The associations consumers hold with disposable versus permanent plate materials my play a mediating role in how palatable the food appears to them. Therefore, the second sub-research questions is:

SRQ 2: Is the effect of plate material on perceived food palatability driven by these associations?

Theoretical framework

This section dives deeper into prior research showing that tableware attributes affect food consumption. Moreover, it explores how plate material can influence perceived food palatability through cognitive associations, with associative network theory as the central explanatory framework. This approach is grounded in concepts from knowledge structures (declarative and procedural knowledge) and consumer categorisation (similarity-based vs. theory-based categorisation).

Tableware attributes

Social, environmental, and atmospheric cues shape our food choices; how much food we consume and how much we enjoy it (Chandon & Wansink, 2012) . More specifically, non-consumable elements such as cutleries and plateware have multiple attributes that can be manipulated, and have a direct influence consumers' perception of food (Wei En Lim & Kay Chai Tay, 2024). In recent years, the role of plate attributes in food perception and intake, and how they differently affect food experiences, has been explored (Davis et al., 2016). Empirical evidence suggests that this line of thinking aligns with Wansink's work. While his work has face scrutiny for methodological flaws, the concept that plate attributes influences food-related behaviour remains supported by subsequent studies. In short, Wansink's research remains valuable and interesting, and more recent studies continue to confirm its relevancy regarding the impact of environmental cues on food consumption, evaluation and sensory perception.

To continue, studies revealed that larger dishware is associated with increased food selection and consumption (Van Ittersum & Wansink, 2011; Wansink et al., 2006). Additionally, larger plates have also been linked to greater food waste (Kallbekken & Sælen, 2013; Wansink & Ittersum, 2013). Also, Qi et al. (2022) indicated that using a larger plate for the same portion size increased the consumption of various foods such as meat, vegetables and rice. In the same study, they referenced to Kallbekken and Sælen (2013) who even showed that larger plates lead to greater waste in a buffet setting. However, the study of Qi et al. (2022) showed no effect on the amount wasted.

Moreover, a significant body of research by Spence, Piqueras-Fiszman, and colleagues has examined how the characteristics of plateware impact food perceptions. They showed that the material of cutlery can significantly affect how we evaluate the food we eat (Harrar & Spence, 2013; Piqueras-Fiszman & Spence, 2011; Spence et al., 2012). For instance, Harrar and Spence (2013) found that eating yogurt with a lightweight plastic spoon alters perceptions of taste, texture, and sweetness compared to eating the same yogurt with a heavier plastic or metal spoon. Moreover, another example where the type of cutlery influences food consumption, according to Szocs and Biswas (2016), forks make you overestimate calories which leads to a lower intake of food, compared to eating with spoons.

Furthermore, Zhang et al. (2023) identified various behaviourally-oriented nudges related to altering plate attributes that shape eating experiences. Sensory properties of tableware have been shown to influence consumers' perceptions of food (Krishna & Morrin, 2007). For instance, plate attributes

such as shape and colour have also been found to affect food perception. Specifically, red plates, compared to blue or white, hindered food consumption due to changes in perceived taste and stop signals, resulting in more food waste (Bruno et al., 2013; Genschow et al., 2012).

Plate material

Williamson et al. (2016) specifically explored the influence of plate materials on food consumption and waste. This research indicated that replacing plastic plates with more sustainable paper plates of the same size and colour resulted in more food waste. However, Qi et al. (2022) study indicated that there was no effect of plate material on food consumption or waste. Although prior research shows that plate characteristics such as weight, shape, colour, and size influence the food experience and perceived quality, the specific role of plate material on food palatability and sensory evaluation has shown mixed findings (Qi et al., 2022; Williamson et al., 2016), and the underlying mechanisms that may explain this relationship are still largely unexplored.

According to Porpino (2016), food experiences are often shaped by behavioural patterns and are influenced by contextual and cultural factors. There is already a body of literature attempting to capture the complexity of how people evaluate and interact with food, reflecting the dynamic interplay between consumer behaviour and various influencing factors (Boulet et al., 2021). Although this study acknowledged that there are a lot of influencing factors – such as socioeconomic status, knowledge and awareness, cultural and ethical beliefs, as well as hunger or satiety levels – that can influence food-related evaluations. This research was specifically focused on the psychological and behavioural mechanisms that can explain the relationship between plate material and perceived food palatability. In particular, it highlights the role of sensory experiences and hedonic evaluation in shaping how consumers perceive and enjoy their food depending on the material of the plate.

Dual-Process Theory: System 1 vs. System 2

The relationship between plate material and perceived food palatability can first be understood through the lens of dual-process theory (Kahneman, 2011). This theory suggests that human decision-making can be distinguish between two types of thinking. System 1 refers to fast, automatic, and intuitive thinking, which relies heavily on mental shortcuts or heuristics. These quick judgments are often based on past experiences and pre-existing associations. This allows for efficient but sometimes biased evaluations. In contrast, System 2 is slow, deliberate, and analytical which relies on conscious reasoning and logical evaluation.

When it comes to food perception, System 1 processing often dominates. There is already a body of literature where nudges (Thaler & Sunstein, 2008), known for tapping into System 1 processing, are used to promote healthier food choices (Marcano-Olivier et al., 2020; van Kleef et al., 2012; Wilson et al., 2016). To continue, as shown in the literature, people are unconsciously influenced by external cues such as plate attributes (Baranowski & Wansink, 2008; Williamson et al., 2016), which is also steered by System 1 processing.

The role of System 1 thinking is not only key to understanding how plate material unconsciously influences food perception but also how these attributes may trigger deeper associations. These automatic evaluations may shape how flavourful, healthy, or enjoyable food appears depending on the plate it is served on. The next section delves into how these associations operate and their potential impact on food evaluations.

Knowledge structures: declarative and procedural

Knowledge structures are the foundational layer to understanding how people think about plate materials and how this knowledge informs food-related perceptions. It can be distinguish between declarative knowledge and procedural knowledge (ten Berge & van Hezewijk, 1999).

Declarative knowledge refers to the meanings that consumers construct to represent important information they encounter in their environment. This includes episodic knowledge (personal experiences) and semantic knowledge (general world knowledge). In the context of this study, declarative knowledge would involve people's memories and general associations about using for example paper vs. ceramic plates. For instance, someone might recall a picnic where paper plates were used (episodic), or believe that ceramic plates are more appropriate for high-quality meals (semantic).

Procedural knowledge refers to how people understand how to do things. In the context of this study, participants might implicitly judge that food served on a disposable plate is meant to be eaten quickly or without care, which may influence how they experience the food itself.

In short, these knowledge structures form the basis of everyday judgments and actions, influencing expectations about food and sensory appeal (Ferbinteanu, 2019). Declarative and procedural knowledge are essential in shaping how people evaluate food when it is served on different plate materials, and may partly explain why identical food can be perceived differently depending on the plate.

Schemas and scripts

Building upon knowledge structures, schemas and scripts provide more detailed explanations of how declarative and procedural knowledge interact to influence perception behaviour. They both refer to mental structures that help individuals organise and interpret information (Pankin, 2013).

A schema – It refers to an associative network which represents a person's declarative knowledge about a concept, object, or event (facts, beliefs, and associations). Schemas allow people to organise and interpret new information quickly based on prior knowledge. This makes it easier to understand the world without needing to process every detail from scratch.

A script – It refers to an associative network of procedural knowledge. Script are mental blueprints for actions and events, and thus help guide behaviour. They allow people to navigate daily life by outlining expected action sequences and typical behaviours associated with a particular concept, in familiar situations.

In the context of this study, schemas explain the associations and beliefs surrounding plate

materials, scripts reflect the habitual expectations people have about how food is experienced or served on different materials. Both are relevant for understanding how people evaluate food and form perceptions of palatability based on contextual cues like plate type.

While schemas explain how people might think about plate materials, and scripts explain how they expect to interact with them, associative network theory further details the connection between these schemas. It explains how meaning concepts are linked to each other; how specific emotions, values, and past experiences are connected within an individual's cognitive network.

Associative networks

This cognitive theory describes how the brain creates mental structures that link concepts together based on experiences and learned associations (Collins & Quillian, 1969). These networks are central to the way people mentally organise information about objects and contexts, such as plate materials and dining settings. When individuals encounter an object (paper vs. ceramic plate), their brain draws on these associative networks to trigger automatic thoughts, behaviours, expectations, and feelings. For instance, assumptions about the quality, taste, or care with which food was prepared, served, and should be consumed or treated.

A study by Williamson et al. (2016) refers to the notion of automatic categorisation which is facilitated by associative networks. They found that the type of plateware influences perception and behaviour, and that disposable plates can trigger a "throwaway" mindset. This mental shortcut may reduce the perceived value or quality of the food served, leading to more negative evaluations. This aligns with research on implicit associations, which shows how subconscious mental links between objects and expectations (such as 'low quality' with disposable items) can influence perception (Greenwald et al., 1998).

According to Piqueras-Fiszman and Spence (2011), physical properties of an object can subconsciously influence evaluation. Sensory experiences can activate specific mental representations and behavioural scripts (Higgins, 1998). The mindless eating theory, developed by Wansink, suggest that people often show unconscious or automatic eating behaviour which is influenced by environmental cues rather than physiological hunger or satiety signals (Baranowski & Wansink, 2008). While mindless eating research is often associated with overconsumption (Wansink & Ittersum, 2013), it also highlights how subtle environmental cues such as plate material may shape expectations of taste or food quality. Contextual elements such as plate material may shape perceptions by reducing attention and cognitive engagement, which could lead to lower evaluations of food. Disposable items may unconsciously signal that the food is less valuable or less carefully prepared. This aligns with behavioural economics theories that highlight how external cues and nudges can steer decisions and judgements without individuals consciously realising their influence (Thaler & Sunstein, 2008).

In short, these associative networks connect certain materials with specific eating contexts, which in turn influence expectations and perceptions of the food. These associations are deeply

embedded within cultural expectations around food and dining, which can affect evaluations at an unconscious level (Bargh & Chartrand, 1999; Porpino, 2016; Wansink, 2010).

Associations between material and context function primarily at an unconscious level, System 1 processing, and can influence how food is perceived in terms of palatability, care, or value. While there is empirical evidence supporting that plate material influences behaviour and that associations can influence food-related evaluations, there is little known about what actually the various associations are people have and where it stems from. Therefore, the first SRQ used qualitative in-depth interviews to explore these association people have with different plate materials, and how they mentally frame food experiences based on plate material.

Multi-method approach

This study aimed to explore associations (study 1) and to quantitatively test whether these associations actually mediate the effect of plate material on perceived food palatability (study 2). To answer these questions, a mixed-methods approach was chosen, combining qualitative interviews and a quantitative experiment.

Sequential mixed-methods design

This research followed a sequential design, with one phase conducted after the other. The qualitative phase informed the quantitative phase. The interviews helped identify various associations, which were subsequently tested in a broader context through a survey. According to the mixed-method study of Small (2011), this approach allows for complementarity, where qualitative data provided exploration, and quantitative data provided explanation. This ensured a well-rounded understanding of the topic. By conducting both interviews and a survey, this study explored both the why and the how behind perceived food palatability linked to plate material.

Study 1: associations with plate material

Method

In line with SRQ 1, study 1 conducted qualitative in-depth interviews to delve into people's mental associations with disposable versus permanent plates, as suggested by the associative network theory. Interviews allowed for gaining in-depth insights into the cognitive and emotional factors that drive these associations, something that is difficult to capture through solely quantitative methods (Hennink et al., 2020). Eventually, the qualitative findings shaped the hypotheses tested in the experimental phase. In this way, the experiment addressed relevant, context-specific factors identified during the interviews.

Participants

This study used convenience sampling for recruitment. The seven participants had the following inclusion criteria. They had different ages (above 18 years old) and genders who occasionally (at least two times a month) eat outside the home, regardless of meal type (breakfast, lunch, or dinner). This means dining at restaurants or cafés, eating takeaway or delivery food, meals eaten in canteens, cafeterias, or food courts, food bought and consumed while traveling or on-the-go. No further specific requirements needed (see Table 1). Convenience sampling was chosen due to its accessibility, cost-effectiveness, and practicality in gathering participants within a limited timeframe (Hennink et al., 2020). Although this approach may not have fully represented the broader population, it allowed for exploratory insights into the associations people have with plate materials.

Table 1

Demographics of Participants

Participants	Age	Sex	Frequency of dining out of home (in x times a month)	City of residence
P1	58	Male	2	Koudekerke
P2	24	Female	2	Den Haag
P3	24	Female	2-3	Wageningen
P4	64	Female	3	Utrecht
P5	64	Male	1	Utrecht
P6	23	Female	2	Wageningen
P7	55	Female	2-3	Utrecht

Data collection

Semi-structured interviews were conducted with seven participants using a detailed interview guide (see Appendix A) that covered key topics, including associations with plate materials, emotional connections, dining contexts and experiences, social norms, feelings of responsibility, perceived guilt, expectations, food waste, and mindful versus mindless eating. The interviews specifically focused on disposable and permanent dishware. However, participants were free to interpret these terms in their own way. For instance, disposable plates could include materials such as paper, plastic, or bamboo, while permanent plates could include ceramic, stone, or porcelain. The researcher deliberately refrained from imposing predefined definitions which allowed participants to form their own associations. This exploratory approach encouraged participants to share their subjective experiences and reveal unconscious cognitive links that might not have been captured through structured surveys or experiments alone.

Data analysis

The data for analysis included transcripts from the semi-structured interviews. All audio recordings were transcribed and anonymised to ensure participants' confidentiality. Consequently, the transcripts of all sessions were analysed using an inductive coding method, a method in which themes and patterns are derived directly from the data rather than being based on predefined categories. This approach was chosen to allow for an unbiased exploration of participants' associations with plate materials. The inductive coding process was conducted using Atlas.ti, where the researcher systematically developed codes based on participants' responses. These codes were documented in a codebook (see Appendix B) and subsequently grouped into broader thematic categories to identify underlying patterns. By allowing themes to emerge organically, this approach provided a rich, exploratory understanding of participants' mental frameworks and perceptions. Finally, the findings and conclusions were derived from these coded data. The study concluded with a discussion that included suggestions for future research and acknowledged the study's limitations.

Ethical considerations

As in every study, this study carefully took into account the ethical considerations. Participants were provided with informed consent and the study's purpose. They consented to the recording of the interviews, and potential implications were explained before conducting the interviews. Furthermore, to protect the privacy of the participants, confidentiality, and anonymity were strictly maintained. Additionally, the researcher ensured that participants felt free to express their opinions without pressure and could withdraw from the study at any moment. At last, data protection measures were implemented to securely store and handle responses in accordance with the data management plan of Wageningen University & Research.

Results

This section of the qualitative results focused exclusively on the factors selected as the basis for the subsequent experiment, guided by the theoretical framework. For a more detailed presentation of the qualitative results, including additional participant quotations and thematic elaborations, the full results section can be found in Appendix C.

The mentioned frequency of each plate material

As outlined in the methodology of Study 1, the terms "disposable" and "permanent" plates were deliberately used without predefined definitions, which allowed participants to form their own associations with it. The frequency of references to different plate materials highlights where associations are strongest. The interview responses revealed that among disposable plates, plastic was the most frequently mentioned material, followed by paper and cardboard. For permanent plates, ceramic and porcelain emerged as the most frequently mentioned materials.

Eating context

The interviews showed a clear distinction made between static and dynamic eating settings. Participants associated disposable plates with dynamic settings, such as fast-food restaurants, outdoor events such as picnics, large social and informal gatherings, where mobility and convenience were prioritised. According to participants, these contexts encouraged mindless eating, a reduced focus on food appreciation, and a perception of food as less valuable. In contrast, permanent plates were linked to static settings, characterised by structured dining experiences, such as home dining or formal restaurant settings, which encouraged more mindful approach to eating, higher food appreciation, and a stronger sense of responsibility for food waste.

Mindful vs. mindless eating

Participants said mindless eating occurs in environments where distractions, time constraints, and convenience are dominant. They described this behaviour as being characterised by the consumption of unhealthy or unappetising food, eating under time pressure, multitasking, lower engagement with the food and environmental distractions. Eating alone or in repetitive food settings also contributed to mindless eating. In such situations, participants reported that speed and convenience often led to a lack of attention to the food being consumed which results in a faster eating pace and reduced enjoyment. In contrast, mindful eating was more commonly described by participants in relaxed settings with minimal distractions and a greater emphasis on social interaction. It was often linked to special meals, occasions that stood out from routine dining, and food perceived as valuable or requiring effort to prepare.

Environmental concerns

Participants associated disposable tableware with negative environmental effects, particularly due to plastic use. Many preferred permanent dishware for sustainability reasons and highlighted workplace

and university policies that promote reusable alternatives. While disposables were seen as practical in some situations, such as festivals or events with limited washing facilities, participants generally expressed a preference to avoid them when possible.

Dining experience and perceived food value

Results showed that disposable dishware is linked to a less enjoyable dining experience. Participants reported that food tasted worse on disposable plates. Additionally, they were associated with low-cost, easily replaceable food, and reinforced a "throwaway" mindset. In contrast, permanent plates were associated with greater food appreciation and sensory enjoyment. According to participants it strengthen the perceived value of food, making meals feel higher in quality and more effortful.

Expectations of the food itself

The findings indicate that disposable plates are primarily associated with convenience, informal settings, and less healthy food choices, while permanent plates are linked to more intentional, health-conscious eating and complex meals. Disposable plates were commonly connected to quick, easy-to-prepare foods that require minimal effort, such as fries, pizza, cake, croissants, and barbecue food. These meals were perceived as lower in nutritional value and often consumed with less awareness or planning. In contrast, permanent plates were associated with higher-quality meals that required more preparation and effort. They were perceived as more suitable for structured dining experiences and full meals rather than quick snacks. Participants perceived these meals as more deliberate and fulfilling. Moreover, plate material not only shaped participants' perceptions of food quality but also influenced their acceptance of certain foods. They found fast food, cake, and snacks more suitable for disposable plates, whereas main meals like pasta and elaborate dishes were expected to be served on permanent plates.

Additional factors

The presence of others – Dining in the presence of others was associated with a more mindful and deliberate eating experience. Social interaction and a relaxed setting contributed to slower eating and greater enjoyment of meals.

Expensiveness and high-quality – The association between permanent plates and dining experiences follows a one-way expectation. Permanent plates are generally seen as the standard, the default choice for everyday dining. However, in high-end restaurants or when dining out, the presence of permanent plates becomes essential. If a sophisticated, expensive meal is served on anything other than permanent plate, participants expressed that it disrupts their expectations of quality and refinement. While not all meals served on permanent plates are necessarily perceived as high-end, participants found it unacceptable for a refined, costly meal to be presented on a disposable plate. Additionally, expensive meals encouraged slower, more mindful eating, as participants reported that when food costs more, they tend to appreciate it more and eat more deliberately.

Study 1 also revealed additional insights into the emotional and social dimensions of food consumption. Participants described a greater sense of obligation to finish their food in formal dining settings, particularly when using permanent plates, due to social expectations and etiquette. In contrast, disposable plates were associated with a more relaxed attitude toward food waste, where discarding unfinished food felt more acceptable. Feelings of guilt and social responsibility also influenced participants' waste-related behaviours, with some describing efforts to minimise waste out of respect for the meal or the person who prepared it. However, as these themes fall outside the primary scope of Study 2, they were not be examined further in the experimental phase. A more detailed discussion of these findings can be found in Appendix C.

Relevance to study 2

Given the strong associations identified in the interviews, plastic and paper were selected as representative materials for disposable plates, while ceramic was chosen for permanent tableware. Moreover, the transition from single-use plastic to paper disposables, mentioned in the introduction, adds additional relevance to the choice of materials for further research. Additionally, **f**ormal vs. casual settings, mindful vs. mindless eating, and environmental concerns were incorporated as moderators to evaluate their influence on food perception. These insights on dining experience and perceived food value shaped the design of Study 2, where perceived food palatability was selected as the dependent variable and sensory appeal, food pleasure, and perceived food quality were included as mediators to explain the relationship between plate material and perceived food palatability. Furthermore, the findings on food expectations of different plate material influenced the selection of stimuli for Study 2. Specifically, cake, representing a flexible and informal food, and pasta, associated with structured main meals, were chosen to examine whether food type moderates the effect of plate material on perceived food palatability. Additionally, health perception, which emerged as a factor in how participants evaluated food appropriateness on different plate materials, was incorporated as a mediator in Study 2. As participants linked plate material to expectations about a meal’s nutritional value. Lastly, in the exploratory section of Study 2, factors such as the presence of others and perceptions of expensiveness and high-quality dining, were included to further explore their role in shaping food perception.

Study 2: the role of food palatability

Study 2 aimed to examine the extent to which plate material shapes food palatability perceptions. Study 2 begins with a theoretical framework introducing the concept of food palatability extensively, followed by a conceptual model, which forms the basis for the experimental methodology.

Theoretical framework

The theoretical framework of Study 1 has already covered the foundational theories of this thesis. In Study 2, the focus shifted more towards existing literature on plate material and food palatability, rather than introducing new theoretical perspectives. This section explores the definition of food palatability, what factors can predict food palatability, and the potential role of plate material in shaping certain perceptions, which in turn informed the hypotheses of the study.

Definition food palatability

Food palatability is a multi-dimensional concept that refers to the sensory appeal of food, shaping consumption behaviour and overall enjoyment. According to Yeomans (1998), palatability is a subjective experience and personal preference for food. It is not an intrinsic property of food itself but rather a hedonic evaluation of sensory experiences, influenced by context, prior experiences, and physiological states. Since hedonic responses to food can drive eating behaviour beyond metabolic needs, palatability plays a crucial role in food selection, consumption, and potential food waste (Yeomans, 1998). Similarly, McCrickerd and Forde (2016) define palatability as the hedonic evaluation of food's sensory characteristics, emphasising its dependence on individual perception rather than objective qualities. Additionally, psychological and environmental factors, such as cultural norms, past experiences, and food presentation, further shape palatability (Forde & Decker, 2022; Spence et al., 2012).

Plate material and food palatability

The relationship between plate attributes and food palatability was extensively discussed in the first theoretical framework. Social, environmental, and atmospheric cues play a crucial role in shaping food choices, consumption, and enjoyment (Chandon & Wansink, 2012), with non-consumable elements like plateware significantly influencing food perception (Wei En Lim & Kay Chai Tay, 2024). Empirical research, including studies by Wansink and others, demonstrates that plate attributes can impact food-related behaviours, with larger plates often associated with increased food selection, consumption, and in some cases, waste (Kallbekken & Sælen, 2013; Qi et al., 2022; Van Ittersum & Wansink, 2011). Additionally, the sensory properties of tableware, such as material, shape, and color, have been shown to influence taste perception and food intake (Bruno et al., 2013; Spence et al., 2012; Zhang et al., 2023). In the interviews of Study 1, participants also associated disposable plates with a diminished eating experience. They described the food as tasting less good, less formal, cheap, and low-quality food, which

can all lower the expectations of food palatability. Based on these insights, the following main effect hypothesis was formulated:

H1: Food served on permanent plates (ceramic) will be rated as more palatable than food served on disposable plates (plastic or paper).

Factors of food palatability

Food palatability is influenced by various factors such as sensory appeal, food pleasure, perceived food quality, health perception and purchase intention.

Sensory appeal – The study of Imtiyaz et al. (2021) shows the importance of sensory appeal, which include factors like taste, appearance, smell, and texture, as key determinant influencing purchase intention, consumption, and satisfaction of consumers towards convenience food. This study implies that sensory appeal plays a significant role in the overall palatability of food. Similarly, Eertmans et al. (2006) suggests that sensory appeal is closely tied to food palatability. In the interview of Study 1, participants also mentioned that permanent plates already adds something to the aesthetics of the food. They belief food on permanent plates are more visually appealing which makes it automatically taste better. Therefore the following hypothesis is formulated:

H2: Sensory appeal mediates the relationship between plate material and perceived food palatability, such that food served on permanent plates (ceramic) leads to greater sensory appeal, which in turn increases perceived food palatability.

Food pleasure – One study explored how food pleasure, in the context of food addiction symptoms, is associated with impulsivity, negative affect, and palatable food consumption. The findings suggest that pleasurable taste responses are linked to the consumption of highly palatable foods (Varnado et al., 2024). Moreover, in the qualitative interviews in Study 1, various interviewees made the link between food pleasure that could have an influence on food palatability. In the interviews of Study 1, participants reported that permanents plates were linked to more enjoyable eating experience. Therefore the following hypothesis is formulated:

H3: Food pleasure mediates the relationship between plate material and perceived food palatability, such that food served on permanent plates (ceramic) leads to greater food pleasure, which in turn increases perceived food palatability.

Perceived food quality – According to McCrickerd and Forde (2016), food quality perception is shaped by sensory features and plays a crucial role in how food is consumed and regulated. It influences energy intake control not only through palatability but also by affecting meal size and satiety. Also in the interviews in Study 1, participants described permanent plates as the “normal” and “how it should be”, whereas disposable plates were associated with low quality, informal dining. Therefore the following hypothesis is formulated:

H4: Perceived food quality mediates the relationship between plate material and perceived food palatability, such that food served on permanent plates (ceramic) is rated as higher in quality, which in turn increases perceived food palatability.

Health perception – In terms of health perception, various studies have explored its impact on food palatability. A study done by Young (2021) developed a model to quantify palatability based on nutrient compositions. These findings showed that foods who are perceived as tastier often had lower nutritional quality. Similarly, other research found that labelling food as 'healthy' reduced enjoyment and palatability ratings (Magee & Hennessy-Priest, 2014). Additionally, a study done by Caltabiano and Shellshear (1998) investigated relative influence of palatability and perceived healthiness on food preferences. It found that palatability was a stronger determinant than health considerations, with some individuals associating healthy food with less palatability. Moreover, in the interviews of Study 1 participants linked disposable plates to unhealthy, fast, and convenience food. Plastic plates were often associated with less nutritious food choices. Therefore the following hypothesis is formulated:

H5: Health perception mediates the relationship between plate material and perceived food palatability, such that food served on permanent plates (ceramic) is perceived as healthier, which in turn decreases perceived food palatability.

Purchase intention – The study of Symmank et al. (2018) did research about the consumer perceptions of bananas at different ripeness levels. The findings suggest that visual appearance strongly influences expected palatability and, consequently, purchase intention. Consumers initially perceived the more ripened, visually suboptimal bananas as less palatable which led to lower purchase intentions. Even after tasting, purchase intention remained lower despite no significant differences in overall liking compared to the control bananas. This indicates that while sensory perception can confirm palatability, initial visual judgments still influence purchasing decisions. Therefore the following hypothesis is formulated:

H6: Purchase intention mediates the relationship between plate material and perceived food palatability, such that food served on permanent plates (ceramic) leads to higher purchase intention, which in turn increases perceived food palatability.

Food palatability can further be influenced by others factors such as sensory properties, personal expectations, and external cues such as price and environmental awareness.

Environmental concerns – Although there is no explicit literature directly linking environmental awareness to food palatability, existing studies explore how consumers assess food quality based on factors such as freshness, taste, nutrition, and environmental concern. According to Wandel and Bugge (1997), consumers who value food quality and prioritise environmental aspects tend to be less satisfied with product quality, which could indirectly influence food palatability. However, this relationship has not been explicitly established in the literature and requires further investigation. Moreover, in the

interviews of Study 1, participants mentioned strong environmental concerns about disposable plates, one of the many reasons why they preferred permanent plates. Since this is the more sustainable option. Possibly, environmentally conscious participants may override sensory expectations in favour of sustainability. This could perhaps reduce the impact of plate material on perceived food palatability. Thus, perhaps the effect of plate material on perceived food palatability will be weaker for individuals with high environmental concerns.

Mindful vs. mindless eating – In the interviews of Study 1, participants linked permanent plates to more mindful and appreciative eating, while disposable plates were associated with distracted and rushed eating. Perhaps mindful eaters engage more attentively with their food, focusing more on the internal qualities of the food, rather than external cues. As a result, they may be less influenced by plate material when evaluating food palatability. In contrast, mindless eaters rely more on automatic and quick judgements, making them more susceptible to external cues such as plate material. In short, mindless eater rely more on external cues (such as plate material) to judge food quality, while mindful eaters focus on intrinsic food attributes, which reduces the effect of plate material on perceived food palatability. Based on this reasoning, the effect of plate material on perceived food palatability can be weaker for mindful eaters than for mindless eaters.

Formal vs. casual dining context – The associative network theory, as explained in the first theoretical framework prior to Study 1, suggests that individuals form strong associations between environmental cues and expectations. This theory helps explain how dining context (formal vs. casual) may moderate the relationship between plate material and perceived food palatability. In the interviews of Study 1, participants strongly associated formal dining context with permanent plates. Participants also mentioned that formal dining setting was associated with high-quality food presentation, refined tableware, and more deliberate food experience. Participants also described it as a social setting where people sit down, take their time to eat, and engage in conversation. While in contrast, casual dining was linked to convenience, quick meals and disposable tableware. It was perceived as more dynamic, with participants mentioning changing seats, walking around, and distraction. Additionally, participants expressed stronger expectations regarding plate material in formal dining settings. In a formal setting, participants considered permanent plates as a must. However, in a casual dining context, plate material was less important. This suggest that formal dining context may have a stronger influence on the relationship between plate material and perceived food palatability than casual dining context. Based on these insights, perhaps the effect of plate material on perceived food palatability will be stronger in formal dining contexts than in casual dining contexts.

Food type

As stated earlier, insights from the qualitative phase indicated that participants hold specific expectations about the appropriateness of certain food on particular plate types. For example, main mails such as

pasta were typically associated with ceramic plates, while informal foods such as cake were seen as more acceptable on disposable plates. These findings suggest that the perceived congruence between food type and plate material may strengthen or weaken sensory and evaluative responses. Additionally, the incongruency appeared to be one-directional: serving main meals on disposable plates was perceived as inappropriate, whereas serving casual foods on permanent plates was generally more accepted. Therefore, the following hypothesis is formulated.

H7: The effect of plate material on perceived food palatability will be stronger for pasta than for cake, as pasta is less congruent with disposable plates.

Exploratory influences on perceived food palatability

Beyond the hypothesised relationships, additional factors may play a role in shaping perceived food palatability. For instance, Jo and Lusk (2018) highlight a trade-off between perceived price and quality, where higher prices signal better quality but may also lower purchase intentions. Their study also discusses the common belief that healthy foods are more expensive and that unhealthy foods are tastier, though some research suggests health information can also act as a taste signal. However, these perceptions vary across countries, prior knowledge, and available information. Interestingly, despite the assumption that tasty food is unhealthy, their findings show a positive correlation between perceived healthiness and taste, emphasizing the complexity of food palatability. Findings from the interview of Study 1 interviews aligned with these insights. Some participants mentioned that expensive food is perceived as better prepared and tastier. Additionally, a few participants emphasised that in high-end restaurants, food must be served on permanent plates, as tableware functions as an indicator of price and quality. Additionally, previous studies on the Food Pleasure Scale (FPS) also provided valuable inspiration for the inclusion of various factors that may influence food palatability, such as eating with others versus alone, food-related memories, habits, and hedonic expectations (Hyldelund et al., 2024). As highlighted in this study of Hyldelund et al. (2024), food pleasure is a multidimensional construct influenced by sensory properties, contextual factors, and individual expectations. The FPS framework emphasises the role of memories and habits in shaping food-related pleasure, while also recognising that eating context (alone vs. social setting) can impact how food is perceived and enjoyed. Moreover, this study suggests that hedonic expectations about how their food will taste and fulfil their expectations can influence overall eating experience. In the qualitative interviews of Study 1, they also mentioned the influence of eating with others vs alone, memories, habits, and hedonic expectations, that can influence. Since these variables are measured with single-item questions and were not the primary focus of this study, there are no hypotheses formulated.

Conceptual model

The conceptual model for Study 2 (see figure 1) shows the relationship between plate material, perceived food palatability, and potential mediators and moderator. This research investigated the effect of plate material on perceived food palatability, which can be influenced by various factors. According to insights derived from Study 1 and existing literature, factors that can influence perceived food palatability are sensory appeal, perceived food quality, health perception, purchase intention. These were taken into account as mediators. Although contextual factors such as formality of the setting, mindful eating, and environmental concerns were initially included in the survey design as moderators based on insights from Study 1, they were not included in the final analysis due to the complexity of the model. The same applied for the exploratory variables.

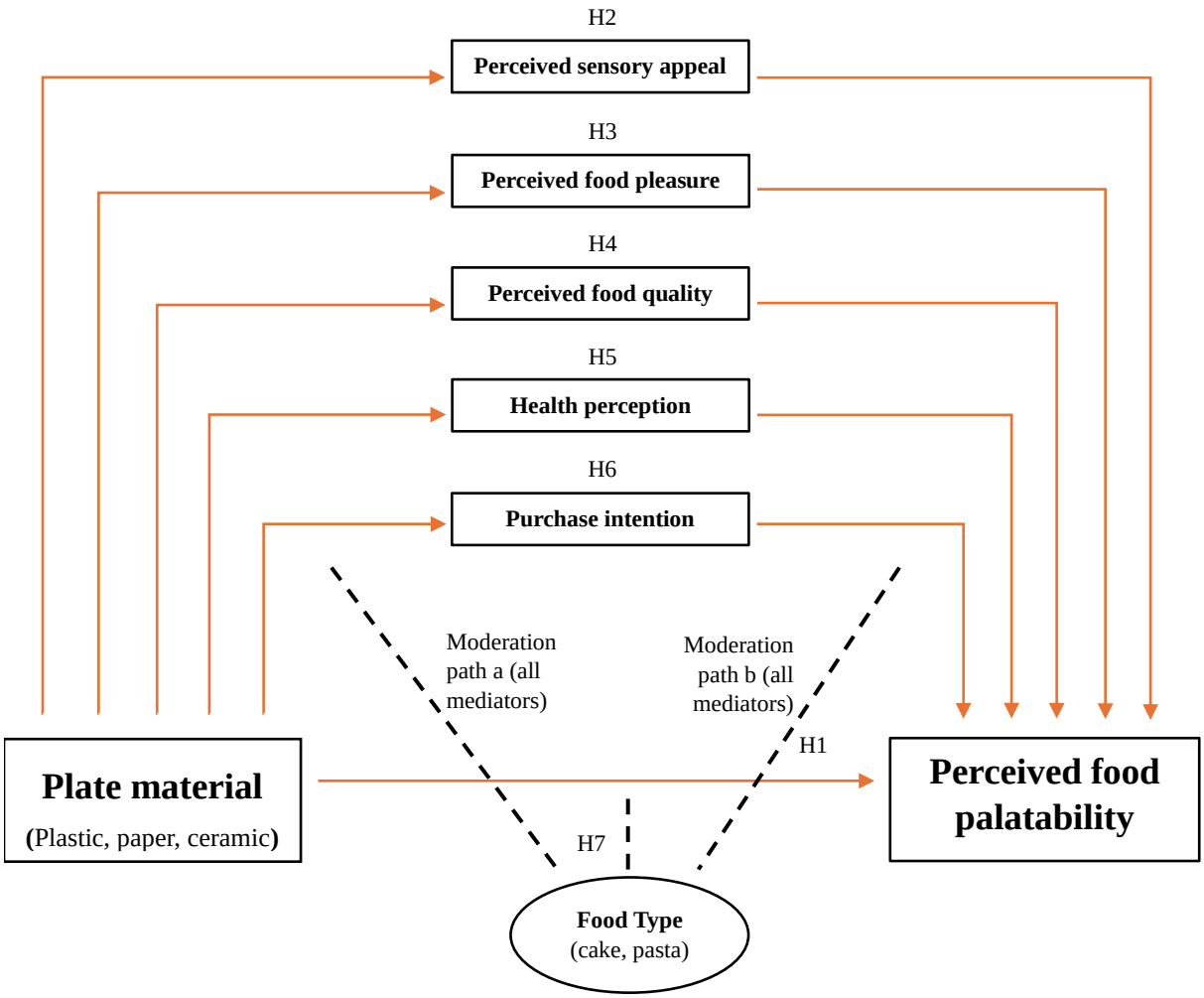

Figure 1

Method

The second study conducted a quantitative approach using an online survey via Qualtrics. The insights derived from Study 1, which explored consumer associations with different plate materials through in-depth interviews, were used to set up Study 2. Study 1 revealed that disposable plates are associated with convenience, casual dining, and lower food appreciation, whereas permanent plates are linked to more mindful eating and a greater sense of value and responsibility toward food consumption. Building on these qualitative insights, Study 2 aimed to explain the relationship between plate material and perceived food palatability.

Study design

The study followed a cross-sectional 1x3 between-subjects experiment (plate material: plastic vs. paper vs. ceramic) and an within-subject factor (type of food: cake vs. pasta), using experimental visual stimuli (food images presented on different plate materials) and self-report measures to assess food perception, experience-and enjoyment, consumption behaviour and contextual influences. The independent variable (IV) was the type of plate material, with three levels: plastic, paper, and ceramic. The dependent variable (DV) was food palatability. Participants were randomly assigned to one of the three plate conditions. They were presented with two food images – one showing a cake and the other a pasta. This survey aimed to explore how the perceived palatability of food may vary depending on the plate material. The relationships that were tested are outlined in the conceptual model above.

Participants

Participants were recruited through text messages, personal contact, and by randomly approaching students on the campus of Wageningen University. Participation was voluntary and only individuals 18 years or older with sufficient English proficiency were allowed. Since participants needed to accurately interpret the survey questions. Furthermore, participants who did not complete the survey, failed attention or manipulation checks, or provided unreliable responses were excluded from the dataset. Additionally, participants needed to agree on the informed consent, otherwise they were also excluded from the dataset. To determine the appropriate sample size, a power analysis was conducted using G*Power version 3.1.9.7 (Faul et al., 2009). The analysis was performed for a one-way ANOVA with three groups, corresponding to the three plate material conditions (plastic, paper, ceramic). The following parameters were used: a significance level (α) of 0.05, a desired statistical power ($1-\beta$) of 0.80, and an expected medium effect size ($\eta 2 = 0.06$, corresponding to $f = 0.25$). The numerator degrees of freedom ($df = 2$) and the denominator degrees of freedom were accounted for based on the planned total sample size. Given these parameters, the required sample size was 159 participants (53 participants per group) to detect an effect with sufficient statistical power. This sample size allows for reliable detection of differences between the groups while maintaining the statistical rigor of the study. To ensure

comparability across groups for individual differences (such as age, gender, education), participants were randomly assigned to one of the three conditions.

Materials & measures

Stimuli selection

Participants were presented with two food images – one of cake and one of pasta, which were displayed on either a plastic, paper, or ceramic plate. The selection of these food images was derived from the qualitative interviews conducted in Study 1, which indicated that food type may influence perceptions of plate material suitability. The choice of cake and pasta can be associated with different dining contexts: cake is commonly associated with snacking and flexible eating occasions, while pasta is typically perceived as a main meal, linked to structured dining settings. Findings from the qualitative interviews suggest that participants placed greater importance on having their main meals served on permanent plates. Since this is more closely associated with formal dining, alternative plate material would be considered unacceptable. In contrast, cake was more commonly consumed on plastic or paper plates, though it was still not preferred, it was considered more acceptable. These insights indicated that food type may moderate the influence of plate material on food palatability, with stronger effects observed for pasta compared to cake.

Independent variable (IV) and dependent variable (DV)

The IV in this study was plate material (plastic, paper, or ceramic). Food palatability, the primary DV, was measured using a Visual Analog Scale (VAS) ranging from 0 (not at all) to 100 (extremely). It was measured using four items. The Food Pleasure Scale (FPS) includes items that evaluate various dimensions of food palatability such as expectations, sensory satisfaction, and the likelihood of recommending the food to others (Hyldelund et al., 2024)

Measurement of constructs

The questionnaire used the self-reported VAS-scale, widely used continuous rating scale (0-100) to measure consumer expectations and perceptions of food-related constructs. This type of scale has been validated in sensory and consumer research to measure differences in food expectations, hedonic responses, and quality perceptions (Andersen et al., 2021; Hyldelund et al., 2024; Imtiyaz et al., 2021). Each construct is measured using previously validated scales adapted from food-related studies in sensory and consumer research. The constructs were derived from the qualitative interviews in Study 1 and from the literature study about determinants for food palatability. The constructs measured include sensory appeal, food pleasure, perceived food quality, health perception, purchase intention, food palatability, and additional exploratory variables. For a detailed overview of the number of items used to measure each construct, as well as the specific content of the individual items, see appendix D.

Mediators

Sensory appeal – It was measured using four items. The Sensory Appeal scale in the Food Choice

Questionnaire shows that consumers form expectations about food appeal based on multiple sensory attributes which include visual appeal, aroma, texture, and taste (Eertmans et al., 2006; Imtiyaz et al., 2021). Food pleasure – It was measured using three items. The framework of hedonic food reward experiences shows that anticipated pleasure serves as a predictor of food-related satisfaction (Recio-Román et al., 2020). The focus of these items are on the expectation that eating the food will be comforting, rewarding and satisfying (Andersen et al., 2021). Perceived food quality – It was measured through three items. Studies have identified freshness, preparation quality, and presentation to be key attributes of perceived food quality (Hyldelund et al., 2024; Petrescu et al., 2019). Health perception – It was measured using two items. According to Imtiyaz et al. (2021), health perception relates to the extent to which food is expected to be healthy and suitable for health-conscious diet. Purchase intention – It was measured using two items. It focused on the consideration of purchasing food products when encountered in various settings (García-Salirrosas et al., 2024; Nguyen et al., 2019).

Demographics

Participants also provided demographic information, which was used to describe the sample characteristics and control for potential confounding variables. In other words, these variables were used to explore whether individual differences influenced food perception and palatability. The demographic questionnaire included: gender, age, dietary preferences, highest level of education.

Attention check and covariates

To ensure data quality and identify inattentive respondents, an attention check question was embedded within the survey: please shift the bar to "100" to show you are paying attention. Participants who failed this check were excluded from the final analysis to maintain data integrity. Additionally, the covariate of hunger level was asked, with a VAS-scale (0-100): 'I am hungry right now'. This self-reported measure was included as a covariate in the statistical analysis to account for individual differences that may influence food perception.

Procedure

Upon entering the survey via Qualtrics, participants were first presented with an informed consent statement, which outlined the estimated duration (approximately 5-8 minutes) and the voluntary nature of participation. Additionally, participants were required to confirm that they we at least 18 years old and allowed to the use of their data for research purposes. Consent was mandatory before proceeding with the survey. Following consent, participants assessed their hunger levels using a VAS-scale (0-100). Participants were then randomly assigned to one of three conditions based on the type of plate material: plastic, paper, or ceramic. Within their assigned condition, they were shown two food images (cake and pasta), each presented on the assigned plate type. After viewing each image, participants completed a series of questions about their expectations and perceptions of the food. Responses were recorded using a VAS-scale (0-100). The questionnaire measured several key constructs as described in the materials

and measures section. To control for order effects, the presentation order of the cake and pasta images was randomized. Each variable was measured twice, once for each food image, with the order of questions randomized to minimize response bias. However, constructs related to environmental concerns and mindful vs. mindless eating were only presented after both food images, as they were not directly linked to a specific food item. Additionally, an attention check was embedded midway through the follow-up questions for each food image to ensure participant attentiveness. Demographic information was collected at the end of the survey. Upon completion, participants were thanked for their participation, and their responses were securely stored. The survey was designed to take no longer than eight minutes, ensuring participant engagement while capturing relevant insights on the relationship between plate material, food palatability, and food perception (see Appendix D).

Data analysis

All statistical analyses were conducted using IBM SPSS Statistics 30.0. Prior to hypothesis testing, the dataset was checked for outliers, missing, invalid, or inconsistent responses. Participants who failed the attention check, or did not complete the survey were excluded from the analysis to ensure data integrity.

Descriptive statistics and recoding

Descriptive statistics, including means, standard deviations, and frequencies, were computed for all key variables. VAS-scale responses were numerically coded from 1 to 100 for statistical analysis. The categorical variables were converted into numerical codes: plate material (1=plastic, 2=paper, 3=ceramic), gender (1=male, 2=female, 3=non-binary/other), dietary preferences (1=no dietary restrictions, 2=vegetarian, 3=vegan, 4=gluten-free, 5=lactose-free, 6=other), and education level (1=no formal education, 2=primary education, 3=secondary education – vmbo, 4=secondary education – havo or vwo, 5=mbo, 6=hbo, 7=university – bachelor's degree, 8=university – master's degree, 9=doctorate or PhD).

Randomization and covariate analysis

To check whether demographic characteristics were evenly distributed across conditions, a randomization check was performed. A one-way ANOVA was used to examine differences in age and hunger level across conditions. A Chi-square test was used to examine differences in gender, dietary preferences, and education level across conditions. This was to control for individual differences that might confound the results. This statistical approach ensured that any observed effects of plate material on perceived food palatability were not influenced by pre-existing individual differences among participants.

Cronback's Alpha test

Multiple items were used to measure each construct. It was therefore important to measure the reliability of these constructs. To determine whether these items could be combined into a single construct, Cronbach's Alpha test was conducted. If the alpha coefficient was between 0.7 and 0.8, the items were

combined. If the alpha was between 0.6 and 0.7, there was an additional review to reconsider the combinations of the questions. If the alpha was below 0.6, the item was removed to improve the internal consistency of the construct. In short, all coefficients were above 0.7, meaning items were combined and no items were removed.

Total effect analysis

To explore the primary research question regarding the total effect of plate material on perceived food palatability, a one-way regression analysis (model 4 – Hayes PROCESS Macro) was conducted. Plate material was treated as a categorical variable (C) and dummy coded, with first plastic plates serving as the reference category, and later ceramic plates. If significant differences were observed, post-hoc pairwise comparisons were performed to determine which plate material conditions differed significantly from one another.

Moderation and mediation analysis

To explore whether the effect of plate material on perceived food palatability was moderated by food type (cake vs. pasta), a moderation analysis (model 1 – Hayes PROCESS Macro) was conducted. Food type was treated as categorical variable, with 1=cake and 2=pasta. Moreover, to examine which factors can explain the effect of plate material on perceived food palatability, a simple mediation analysis (model 4) was conducted. Furthermore, a moderated mediation analysis (model 58) was conducted to explore whether the mediation effect was moderated by food type. Besides, a mixed-design ANOVA was conducted to examine the effects of plate material and food type on perceived food palatability. The analysis included food type as a within-subjects variable and plate material as a between-subjects variable.

Assumption testing

Prior to hypothesis testing, a series of statistical assumptions were examined to ensure the validity of the analyses. Normality was assessed using the Kolmogorov-Smirnov and Shapiro-Wilk tests. In addition, skewness and kurtosis values were inspected to evaluate the distribution of the data. Homogeneity of variance across groups was tested using Levene's test. Multicollinearity diagnostics were conducted by examining the Variance Inflation Factor (VIF), Tolerance values, and the Condition Index to ensure that predictor variables were not highly correlated. At last, the overall explanatory power of the model was considered using appropriate fit indicators. These diagnostic checks ensured that the assumptions underlying the planned analyses were sufficiently met before proceeding with hypothesis testing.

Ethical Considerations

As in every study, this study carefully took into account the ethical considerations. Participants were provided with an informed consent form before beginning the Qualtrics. No personal identifiable information was collected, ensuring confidentiality and anonymity throughout the process. Participants

were informed that their participation was voluntary, that they could withdraw at any time without providing a reason, and that their responses would be used solely for research purposes. At last, data protection measures were implemented to securely store and handle responses in accordance with the data management plan of Wageningen University & Research.

Results

Descriptives

A total of 190 participants completed the survey, with 172 participants included in the final analysis after data cleaning. The participants' ages ranged from 18 to 76 years old (M = 32.41, SD = 15.76). The sample was 70% female and 30% male. Age (F(2,169) = .240, p = .787), gender (p = .949), education level (p = .290), and dietary preferences (p = .156) were evenly distributed across the three experimental conditions. However, hunger level, rated on a 0-100 scale (M = 36.16, SD = 27.51) showed a marginal difference between conditions (F(2,169) = 3.033, p = .051). Participants in condition 3 (ceramic plates) reported slightly higher hunger levels compared to the other conditions.

Assumption checks

Prior to conducting hypothesis tests, several statistical assumptions were checked. Normality of the dependent variable, perceived food palatability (PAL), was assessed using the Kolmogorov-Smirnov and Shapiro-Wilk tests. Both tests indicated significant deviations from normality for all conditions. This suggests that the data is not normally distributed. Furthermore, the skewness (-.257) and kurtosis (-1.176) values indicate mild to moderate deviations from a normal distribution. Homogeneity of variance was not significant across groups, which is confirmed by Levene's test (p = .261, .738, .355). Multicollinearity was not a concern. As VIF (1.000) and Tolerance (1.000) remained within acceptable limits. The Condition Index (5.133) was below the threshold for concern. Extreme values (0 and 100) were present but evenly distributed across conditions. Thus, no need for removal. All assumptions were met, except for normality. Besides these checks, the model showed low explanatory power with a pseudo-R-squared value of .02.

Main effect (total effect of plate material on perceived food palatability)

The mean values indicated a notable difference in perceived food palatability depending on the plate material (1=plastic, 2=paper, 3=ceramic) and food type (cake, pasta). For the perceived food palatability of cake (PAL_c), the mean scores increased across the three groups: M = 46.91 (SD = 26.12) for group 1, M=49.44 (SD = 23.58) for group 2, and M = 52.84 (SD = 26.84) for group 3. This trend was similar for pasta (PAL_p), with means of M = 65.59 (SD = 2.30) for group 1, M = 69.97 (SD = 18.38) for group 2, and M = 77.25 (SD = 16.54) for group 3. Across all measures, the perceived food palatability of pasta scored consistently higher than of cake.

Although the independent variable (plate material) was statistically significant, F(1, 341) = 6.988, p = .009, the small effect size suggests a limited predictive power of plate material on food palatability. In other words, while plate material significantly predicted perceived food palatability, the strength of this relationship was weak. A one-way regression analysis (model 4 – Hayes Process) was conducted to examine the total effect of plate material on perceived food palatability (PAL). Plate material was treated as a categorical variable (C) and dummy coded, with first plastic plates serving as

the reference category, and later ceramic plates. The overall model was significant, $F(2, 340) = 3.55$, $p = .030$, and explained approximately 2.1% of the variance in food waste ($R^2 = .0205$). Pairwise comparisons showed that participants who saw the ceramic plates (vs. plastic plates) had a significantly higher perceived food palatability than those who saw the paper plates (vs. plastic plates), $B = 8.80$, $SE = 3.32$, $t = 2.65$, $p = .008$, 95% CI [2.26, 15.33]. In contrast, the difference in perceived food palatability between plastic plates and paper plates was not significant, $B = 3.37$, $SE = 3.20$, $t = 1.05$, $p = .293$, 95% CI [−2.93, 9.67]. Also the comparison between paper and ceramic plates was not significant, $B = –5.43$, $SE = 3.26$, $p = .0974$, 95% CI [–11.85, 1.00]. In short, ceramic plates led to significantly higher perceived food palatability than plastic. The differences between paper and the other plate materials were not significant.

Table 2

Results of Contrast Analyses for Perceived Food Palatability (PAL) Across Plate Materials

Contrast	Coefficient	p-value	Findings
X1 (paper vs. plastic)	3.37	.293	PAL did not differ between the two conditions.
X2 (ceramic vs. plastic)	8.80	.0085	PAL did differ between the two conditions.
X3 (paper vs. ceramic)	-5.43	.0974	PAL did not differ between the two conditions.

Moderation effect on total effect

A moderation analysis (model 1 – Hayes PROCESS Macro) was conducted to test whether the effect of plate material on perceived food palatability depends on food type. There was a significant main effect of food type on perceived food palatability ($B = 18.68$, $SE = 4.17$, $t = 4.48$, $p < .001$), with higher perceived food palatability for pasta compared to cake. However, there was no significant interaction between plate material and food type ($p = .63$). This suggests that food type did not moderate the relationship between plate material and perceived food palatability.

Mediation effect

A simple mediation analysis (model 4 – Hayes PROCESS Macro) was conducted to examine whether the effect of plate material on perceived food palatability (PAL) was mediated by the mediators: sensory appeal (SEN), food pleasure (FP), perceived food quality (QUL), health perception (HP), purchase intention (PI).

Plate material significantly predicted SEN, with higher SEN scores for both paper ($B = 7.00$, $p = .019$) and ceramic ($B = 9.99$, $p = .001$) compared to plastic, and with paper having a lower score than ceramic ($B = -9.99$, $p = .002$). In turn, SEN was a strong predictor of perceived food palatability ($B =$

.97, p < .001). The indirect effect of paper compared to plastic via SEN was significant (*B* = 6.89, 95% CI [1.28, 12.73]), as was the indirect effect for ceramic vs. plastic (*B* = 9.63, 95% CI [3.69, 15.85]) and paper vs. ceramic (*B* = -9.72, 95% CI [–15.87, –3.56]). These results indicate that SEN mediates the relationship between plate material and perceived food palatability, with first ceramic and then paper plates leading to higher perceived food palatability than plastic, through their effect SEN.

For FP, ceramic plates (vs. plastic) significantly predicted higher FP scores (*B* = 7.30, *p* = .041), while the paper vs. plastic contrast was not significant (*p* = .396). Paper plates led to significantly lower scores than ceramic (*B* = -7.30, *p* = .043). FP predicted perceived food palatability (*B* = .81, *p* < .001), and the indirect effect was significant for ceramic vs. plastic (*B* = 6.26, 95% CI [0.28, 12.36] and for paper vs. ceramic (*B* = -5.78, 95% CI [–11.32, –0.22]). This indicated a partial mediation.

For QUL, ceramic plates led to significantly higher QUL scores compared to plastic (*B* = 9.91, *p* = .002), while paper did not differ from plastic (*p* = .222). Paper led to significantly lower scores than ceramic (*B* = -9.91, *p* = .002). QUL predicted perceived food palatability (*B* = .82, < .001), and the indirect effect was significant for ceramic vs. plastic (*B* = 8.27, 95% CI [3.23, 13.04]) and also for paper vs. ceramic (*B* = -7.49, 95% CI [–11.99, –2.83]). This suggests that QUL partially mediates the effect of ceramic plates on perceived food palatability compared to plastic.

In contrast, HP did not mediate the relationship between plate material and perceived food palatability. Neither contrast (paper or ceramic vs. plastic) predicted HP (*p* > .05), also paper vs. ceramic was not significant (*p* = .60), and the indirect effects were not significant.

Finally, for PI, ceramic plates predicted higher PI scores (*B* = 9.54, *p* = .012), while paper did not (*p* = .314). Paper also predicted lower PI scores than ceramic (*B* = -9.54, *p* = .015). PI significantly predicted perceived food palatability (*B* = .74, p < .001), and the indirect effect was significant for ceramic vs. plastic (*B* = 6.84, 95% CI [1.34, 12.18]) and for paper vs. ceramic (*B* = -6.63, 95% CI [–11.75, –1.41]). This indicated a partial mediation.

To conclude, a significant mediation effect was found for the difference for ceramic vs. plastic and ceramic vs. paper, but not between plastic and paper, for the mediators FP, QUL, and PI. With the mediator SEN, all plate material differ significantly from each other (see Table 3 for the summary).

Table 3

Results Mediation Analyses of the Effects of Plate Material on Perceived Food Palatability

Mediator	**Significant path X → M**	**Significant path M → Y**	**Significant Indirect effect (Boot 95% CI)**	**Interpretation**
SEN	X1: *p* = .0194 X2: *p* = .0014 X3: *p* = .002	p<.001	X1: CI [1.28, 12.73] X2: CI [3.69, 15.85] X3: CI [–15.87, –3.56]	Full mediation via SEN for all contrasts.

FP	X1: p = .396	p<.001	X1: CI [−2.62, 6.93]	Partial
	X2: p = .0411		X2: CI [.28, 12.36]	mediation via
	X3: p = .043		X3: CI [–11.32, –.22]	X2 and X3 only.
QUL	X1: p = .2221	p<.001	X1: CI [−1.37, 6.36]	Partial
	X2: p = .0019		X2: CI [3.23, 13.04]	mediation via
	X3: p = .001		X3: CI [–11.99, –2.83]	X2 and X3 only.
HP	X1: p = .6705	p<.001	X1: CI [−3.33, 1.95]	No mediation.
	X2: p = .5983		X2: CI [−2.18, 3.57]	
	X3: p = .604		X3: CI [–3.74, 2.28]	
PI	X1: p = .3140	p<.001	X1: CI [−2.19, 6.73]	Partial
	X2: p = .0119		X2: CI [1.34, 12.18]	mediation via
	X3: p = .015		X3: CI [–11.75, –1.41]	X2 and X3 only.

Moderated mediation effect (a- and b-path)

A moderated mediation analysis (model 58 – Hayes PROCESS Macro) was conducted to examine whether the mediation effect was moderated by whether they saw cake or pasta. Since HP turned out not to be a meaningful mediator in the model, this one is excluded from the following moderated mediation analysis. This analysis consisted of moderation on a-path (X → M), moderation on b-path (M → Y), and moderated mediation (conditional indirect effect + moderated mediation index). In conclusion, the strength of the mediation does not significantly differ between food types. Below there are more detailed results why.

Moderation on a-path:

None of the a-paths show a significant interaction between plate material and food type (see Table 4). This suggests that the impact of plate material on the mediators is not influenced by the type of food (cake vs. pasta).

Table 4

Interaction Effects of Plate Material and Food Type on Mediators

Mediators	X1 x FoodType	X2 x FoodType	X3 x FoodType
SEN	p = .83	p = .43	p = .29
FP	p = .90	p = .59	p = .51
QUL	p = .75	p = .64	p = .46
PI	p = .90	p = .83	p = .72

Moderation on b-path:

Only the effect of PI on PAL is moderated by food type (B = -.2071, p = .003). The effect is stronger for cake (B = .76) than for pasta (B=.56), both effects are significant. All the other mediators did not show a significant moderation, which means that the effect of the mediator on the DV does not depend on food type.

Table 5

Food Type as Moderator of Mediator Effects

Mediators	Interaction	Cake (effect on Y)	Pasta (effect on Y)	Significant
SEN x FoodType	B = .016, p = .74	B=.92, p < .001	B=.92, p < .001	No
FP x FoodType	B = -.1083, p = .20	B=.91, p < .001	B=.80, p < .001	No
QUL x FoodType	B = -.125, p = .18	B=.87, p < .001	B=.75, p < .001	No
PI x FoodType	B = -.2071, p = .0027	B=.76, p < .001	B=.56, p < .001	Yes

Conditional indirect effects (moderated mediation):

For X1, (paper vs. plastic plates), only a significant indirect effect was observed via SEN for pasta (effect = 6.03, 95% CI [0.28, 12.22]), while the same effect was not significant for cake (effect = 7.02, 95% CI [–1.13, 14.99]). No other mediators showed significant conditional indirect effects. For X2 (ceramic vs. plastic plates), significant indirect effects were found via SEN (effect = 11.70, 95% CI [5.31, 18.32]), FP (effect = 6.25, 95% CI [0.85, 11.73]), and PI (effect = 5.74, 95% CI [0.30, 11.42]) for pasta. For cake, only the mediation through QUL was significant (effect = 6.47, 95% CI [0.44, 12.75]). For X3 (paper vs. ceramic plates), significant indirect effect were only found via SEN (effect = -5.67, 95% CI [-11.13, 6.41]) and QUL (effect = -5.25, 95% CI [-10.05, -0.35]) for pasta.

Table 6

Conditional Indirect Effects of Plate Material by Food Type

		Food Type	Indirect (mediated) effect by food type (a x b)	95% CI	Significant
	Paper vs. plastic (X1)				
SEN		Cake	7.02	[–1.13, 14.99]	No
		Pasta	6.03	[.28, 12.22]	Yes
FP		Cake	2.56	[–4.77, 9.94]	No
		Pasta	1.69	[–3.50, 7.16]	No
QUL		Cake	3.40	[-2.07, 9.17]	No

		Pasta	1.74	[-3.03, 6.83]	No
PI		Cake	3.05	[-3.47, 9.42]	No
		Pasta	1.75	[-3.43, 7.25]	No
	Ceramic vs. plastic (X2)				
SEN		Cake	7.13	[–1.72, 15.93]	No
		Pasta	11.70	[5.31, 18.32]	Yes
FP		Cake	4.41	[–3.46, 12.36]	No
		Pasta	6.25	[.85, 11.73]	Yes
QUL		Cake	6.47	[.44, 12.75]	Yes
		Pasta	6.99	[2.43, 11.92]	Yes
PI		Cake	6.70	[-.79, 14.08]	No
		Pasta	5.74	[.30, 11.42]	Yes
	Paper vs. ceramic (X3)				
SEN		Cake	-0.11	[-8.56, 8.42]	No
		Pasta	-5.67	[-11.13, -0.01]	Yes
FP		Cake	-1.85	[-10.02, 6.41]	No
		Pasta	-4.56	[-9.52, 0.37]	No
QUL		Cake	-3.07	[-9.60, 3.08]	No
		Pasta	-5.25	[-10.05, -0.35]	Yes
PI		Cake	-3.66	[-10.64, 3.83]	No
		Pasta	-4.00	[-8.90, 1.06]	No

Moderated mediation index:

For none of the mediators, the moderated mediation index was significant. This means, while some individual indirect effects may be significant (e.g., for pasta only), the difference between pasta and cake is not large enough to conclude that food type significantly moderates the mediation path. Thus, it can be concluded that the mediation effect does not depend significantly on whether the food they saw was cake or pasta.

Table 7

Moderated Mediation Index

	Index	**95% CI**	**Significant**
SEN X1	-.96	[-10.87, 9.21]	No
SEN X2	4.57	[-6.27, 15.29	No
SEN X3	-5.56	[-15.58, 4.74]	No
FP X1	-0.87	[–9.83, 8.51]	No

FP X2	1.85	[–7.84, 11.66]	No
FP X3	-2.71	[-12.24, 6.73]	No
QUL X1	-1.66	[-9.13, 5.61]	No
QUL X2	0.52	[-7.02, 8.49]	No
QUL X3	-2.18	[-10.22, 6.04]	No
PI X1	-1.30	[–9.59, 7.23]	No
PI X2	-0.97	[–1.24, 8.27]	No
PI X3	-0.33	[-9.24, 8.18]	No

Within-subject analysis

A 3 (plate material: paper, plastic, ceramic – between-subjects) x 2 (food type: pasta, cake – within-subjects) mixed-design ANOVA, revealed a significant main effect of food type on perceived palatability, $F(1, 169) = 109.22$, $p < .001$, $\eta^2 = .393$, with pasta ($M = 7.94$) rated more palatable than cake (M = 49.73). There was also a significant main effect of plate material, $F(2, 169) = 3.37$, $p = .037$, $\eta^2 = .038$. Post hoc comparisons (Bonferroni-adjusted) showed that food on ceramic plates was rated significantly more palatable than food on plastic plates (mean differences = -8.80, $p = .032$). The other pairwise comparisons (paper vs. ceramic and paper vs. plastic) were not significant. However, the interaction between plate material and food type was not significant, $F(2, 169) = .66$, $p = .517$, $\eta^2 = .008$. This means that the effect of plate material does not depend on food type. In other words, ceramic boosts palatability across both cake and pasta similarly, no moderation by food type.

Discussion

Summary of findings & connection to hypotheses

The central hypothesis of this thesis was that plate material influences perceived food palatability, and that this relationship is mediated by underlying psychological constructs such as sensory appeal, food pleasure, perceived food quality, health perception, and purchase intention. Additionally, it was hypothesised that food type (cake vs. pasta) would moderate this relationship. Through a sequential mixed-method design, Study 1 first identified associations between disposable (plastic and paper) and permanent plates (ceramic) in different dining experiences. These qualitative insights informed the experiment hypotheses tested in Study 2. The quantitative findings partially confirmed these hypotheses, ceramic plates lead to significantly higher perceived food palatability compared to plastic plates. This supported the hypothesis that permanent plates (vs. disposable plates) increase sensory evaluations of food. However, the difference in palatability ratings between ceramic and paper plates, as well as between paper and plastic, was not statistically significant. Therefore, the findings partially supported H1: the null hypothesis was rejected for the ceramic vs. plastic comparison, but not for the ceramic vs. paper comparison. This suggests perhaps a more nuanced relationship for paper plates, which may be perceived as more neutral or transitional.

Mediation analyses provided more insights into what perhaps can explain this main effect. All mediators influenced perceived food palatability directly. However, not all mediators were affected by plate material. Three mediators – food pleasure, perceived food quality, and purchase intention – partially mediated the relationship between plate material and perceived food palatability, in particular ceramic (vs. plastic and paper plates). The comparisons between plastic and paper plates showed no mediation. Sensory appeal was the only mediator who showed full mediation for all contrasts, while health perception did not function as a mediator in any case. Therefore, the findings fully supported H2, H3, H4, H6: the null hypothesis was rejected for all permanent vs. disposable plate comparison, only the null hypothesis of H5 was accepted for all contrasts.

Moderation analyses, on the other hand, did not support the hypothesis that food type would moderate the effect of plate material on perceived food palatability. Neither the interaction between plate material and food type, nor the moderated mediation indices, were statistically significant. This was consistent across simple moderation, conditional indirect effects, and moderated mediation models. The within-subjects analysis using a mixed ANOVA confirmed these findings, showing significant main effects of both plate material and food type on perceived food palatability, but no significant interaction. Although food type did have a main effect – pasta was generally rated more palatable than cake – it did not interact with plate material in influencing the mediators or the final palatability ratings, the effects were rather additive than interactive. To conclude, the null hypothesis of H10 was accepted.

Theoretical reflection

The qualitative findings from Study 1 align with the Associative Network Theory (Collins & Quillian,

1969), which suggests that individuals draw on mental associations and schemas to interpret environmental cues. In this case, ceramic plates activated schemas of structured, high-quality dining, which raised expectations and evaluations of the food served. Participants associated permanent plates with quality, care, effort, mindfulness, and even sustainability, which adds to their use in meaningful or special dining contexts. Plastic and paper, on the other hand, triggered associations of disposability, lower value, and convenience, which lowered food expectations and reduced mindful engagement with the food itself.

Furthermore, results of Study 1 suggested a predominantly one-sided associative pattern regarding plate materials. Specifically, permanent plates appeared as the default which generated consistently positive or neutral associations across diverse dining contexts, from routine meals to high-quality dining events. In contrast, disposable plates trigger context-dependent associations. It was only acceptable in certain or necessity-driven situations and clearly unacceptable in formal or meaningful dining situations.

This asymmetry in associations also aligns with the Associative Network Theory. Permanent plates, being commonly used and accepted across diverse dining settings, have developed broad, stable associative networks that involve everyday dining schemas (routine) as well as schemas for structured, special, mindful, or high-quality dining contexts. Consequently, permanent plates hold a default positive association that consumers readily activate across context. Conversely, disposable plates activate narrower, situation-specific schemas associated primarily with casualness, convenience, disposability, and less mindful eating. This means when disposable plates appear in contexts that activate high-quality dining schemas, a clear associative mismatch occurs which violates fixed expectations and norms.

This mismatch triggers negative emotional responses which can be explained by the Schema Theory (Pankin, 2013). Schemas function as mental frameworks guiding expectations. Thus, when schema-incongruent stimuli are encountered, such as disposable plates used in a context calling for permanent plates, individuals experience cognitive discomfort or emotional dissonance, which can be explained by the familiar Cognitive Dissonance Theory (Festinger, 1957). This theory suggests that incongruencies between expectations (schemas) and reality (context) produce psychological discomfort. In this particular case, the negative emotions observed when disposable plates appeared inappropriately reflect this dissonance. Consumers aim to resolve this discomfort either by adjusting their expectations downward (lowering food expectations) or rejecting the appropriateness of the disposable plate entirely.

In short, the one-sided associative pattern can be explained by the deeply rooted cognitive stability of permanent plates' broad, positive schema versus the fragile, context-bound schema of disposable plates. The emotional and cognitive dissonance triggered by schema-incongruent plate use reveals how implicit expectations and automatic associations shape consumer perception and behaviour, and thus how food is perceived before it is even tasted.

As showed, these cognitive scripts and schemas support the idea that environmental stimuli such as plate material, activate automatic mental shortcuts. This aligns with dual-process models of decision-

making, where System 1 (fast, intuitive processing) interprets contextual cues and guides evaluations and appears to dominate evaluation of food when based on plate material. This suggests that palatability judgements are made rapidly and unconsciously. In this case, participants' judgments of food were not made on taste but were shaped pre-consumption based on visual and material cues, which also aligns with the sensation transference theory (Cheskin, 1957); where ceramic plates functioned not only as mediums but as key elements of the dining experience, transferring their perceived value to the food itself.

The quantitative results from Study 2 confirm that environmental cues such as plate material affect hedonic evaluations of food. The role of sensory appeal, food pleasure, perceived food quality, and purchase intention as mediators reflects the process of sensation transference; whereby non-food attributes transfer emotional and perceptual qualities to the food itself (Wei En Lim & Kay Chai Tay, 2024). Notably, health perception did not significantly mediate the effect. While participants associate plate material with experiential qualities, it did not change perceived nutritional value.

Interestingly, there was a lack of significant difference between paper and plastic, they were perceived as similar, while ceramic stood out. Only for sensory appeal, all contrasts differed significantly from each other. It could be that sensory appeal is a more general mediation, and therefore more sensitive to all contrasts between plate material, while the other mediators may capture attributes more unique to ceramic plates, for instance quality and luxury. Another possible explanation may be the distinction between disposable and permanent plates. Given that both paper and plastic are classified as disposable plates, it is not surprising that they generate similar associations, as they are typically used in comparable settings and under similar conditions. Nonetheless, there are other visual or tactical cues (such as weight, texture, and perceived durability) that may influence judgments more than disposability alone.

The absence of a significant moderation effect of food type was unexpected, especially since Study 1 indicated that participants had clear expectations for which foods "belong" on specific plate types. This inconsistency may be due to the use of static images in the experiment, which cannot fully replicate the real dining context. It is possible that stronger effects would emerge in real-world settings where the full sensory experience, including touch and interaction with tableware, is present.

Possible explanations

Several psychological and contextual factors may explain the observed results. First, the finding that ceramic plates led to significantly higher perceived food palatability than plastic plates can be interpreted through the lens of automatic categorisation. Consumers appear to automatically categorise ceramic plates within schemas of quality, care, and structured dining, which primes more positive sensory and emotional evaluations of the food itself before it is even tasted. In contrast, plastic plates activate schemas associated with casualness and disposability, resulting in lower palatability expectations.

The significant mediation effect of sensory appeal across all contrasts further supports this

mechanism. Sensory appeal likely functions as a broad, low-level evaluative response that is highly sensitive to even subtle changes in presentation, including differences between paper and plastic. In contrast, other mediators such as food pleasure, perceived food quality, and purchase intention capture higher-order evaluations that seem more strongly associated with permanent, higher quality, plates.

The fact that all mediators influenced perceived food palatability, but not all were significantly influenced by plate material, suggests a layered evaluation process. While sensory, emotional, and evaluative processes all contribute to how palatable food is perceived, only certain psychological dimensions are sensitive to changes in plate material. Sensory appeal, being more immediate and low-level, reacts perhaps more broadly to changes in the visual and material cues, while pleasure, quality, and purchase intention reflect deeper, more reflective evaluations which may be triggered predominantly by ceramic plates. Health perception did not act as a mediator. This suggests that nutritional evaluations are more resilient to external material cues, which may be based more on conscious, food-specific knowledge rather than contextual or sensory cues.

Thus, the overall pattern of findings reveals that ceramic plates improve food palatability relative to disposable plates, and that this difference is psychologically explained by heightened sensory appeal and stronger emotional and evaluative responses associated with permanent, high-quality tableware. and that this effect is psychologically mediated through heightened sensory and emotional responses triggered by environmental cues.

Implications

Food palatability and plate waste – Food palatability can be used as a proxy for food waste behaviour. As it directly influences an individual's willingness to consume food, it is a strong predictor for plate waste. Research consistently shows that the more appealing a food is in terms of taste, texture, aroma, and visual presentation (food palatability), the less likely it is to be wasted (Lorenz et al., 2017). Studies on school meal programs found that unappetising foods were more frequently discarded (Blondin et al., 2015; Boschini et al., 2020). The role of sensory appeal in food intake is further supported by (Yeomans, 1998), who stated that higher palatability triggers hedonic responses which increases food consumption and reducing waste. Beyond individual taste perception, Spence et al. (2012) emphasise the importance of multisensory integration in dining experiences. This research indicates that when the flavour, texture, and aroma of a dish align with expectations, food intake increases and waste decreases. Forde and Decker (2022) further showed that taste and palatability strongly influence food acceptance, which makes them crucial factors in food waste reduction strategies. While palatability plays a crucial role in food intake control, palatability alone does not fully determine consumption behaviour. Other sensory cues, such as visual appeal, smell, and texture, interact with palatability to regulate food intake (McCrickerd & Forde, 2016). Additionally, De Graaf et al. (1999) conduced an experiment on tomato soup which revealed that when a food item was perceived as less palatable, participants consumer only 65% or 40% of the intake compared to the highly palatable version. This suggests that less enjoyable

food is more likely to be wasted. To conclude, by increasing the perceived palatability through selection of plate materials, it is possible to indirectly reduce food waste, particularly in casual dining environments where waste rates are high. Thus, the psychological effects uncovered in this study may have direct implications for sustainability efforts aimed at minimising food waste.

Theoretical implications – This thesis contributed to food psychology and consumer behaviour literature. It provided insights into the role of non-food environmental cues, such as plate material, in shaping food evaluations through associative mechanisms. This study integrated associative network theory, dual-process theory, and sensations transference theory into a comprehensive framework to explain how non-edible aspects of dining can activate associations that can influence perceived palatability. It showed that seemingly minor contextual cues – such as what we serve food on – can influence judgements and consumer behaviour. The mediating roles of sensory appeal, food pleasure, perceived food quality, and purchase intention deepen the understanding of how small environmental triggers shape consumer behaviour at a largely subconscious level. Moreover, by linking these mechanisms to sustainability themes, this research extends the associative network theory into the domain of sustainable consumption behaviours.

Practical implications – These findings can be relevant for the food service industry, sustainability initiatives, and policymakers. Restaurants and food providers seeking to improve customer satisfaction and reduce food waste could benefit from investing in high-quality, permanent tableware such as ceramic, which increases sensory evaluations of meals. Importantly, in the context of sustainability policies such as the EU Single-Use Plastics Directive, this research provided an additional argument in favour of reducing plastic use: not only is it better for the environment, but it may also indirectly reduce food waste by preserving food palatability. However, shifting to sustainable disposables such as paper requires careful attention to sensory and aesthetic qualities. Simply replacing plastic with paper may not automatically lead to higher consumer evaluations. Design choices that replicate the permanence and aesthetic appeal of traditional plates could bridge the sustainability-functionality gap which could maximise both environmental and behavioural benefits. Finally, interventions to reduce food waste in casual or fast-food settings could explore how simple changes in tableware design may shift consumer behaviour. Policymakers could consider the change in plate material as environmental nudges, which can function as subtle and yet effective tools food behaviour change, and can help reduce food waste.

Limitations

Despite the valuable insights provided by this research, several limitations should be acknowledged. First, due to time constraint, the qualitative phase relied on a relatively small, convenience-based sampling, which limited the generalisability of the findings. While rich insights were obtained, future studies should aim more diverse and representative participants pools to strengthen external validity.

Second, the experimental phase conducted a between-subject design using visual stimuli

(images of food on different plate materials). This design eliminates the risk of carryover effects since participants are exposed to only one condition, leading to clearer comparisons between groups. Also, this design has the ability to meet all three essential requirements for demonstrating cause and effect: manipulation, randomisation, and comparison/control. However, there are also several limitations to this design choice. A key limitation is the need for larger samples sizes, as each group required separate participants. Additionally, between-group variability must be carefully managed to ensure that differences in outcomes are due to the manipulation of the IV rather than pre-existing differences among participants. In this study, there was unfortunately a pre-existing difference of hunger level among participants. Furthermore, images do not fully capture the multisensory and tactile aspects of real-world dining experiences, which potentially underestimates the true influence of plate material. Moreover, the questionnaire was relatively long, which may have introduced participant fatigue, possibly reducing attention or consistency in responses.

Third, although the conceptual model included multiple mediators, the complexity of the design required practical compromises. Moderators such as environmental concern, mindful eating, and dining context, which were identified as relevant during Study 1, were not included in the final statistical analysis. Consequently, important nuances regarding how plate material influences perceived food palatability, and specifically the conditions under which these effects emerge, may not have been fully captured.

Fourth, while plate material was manipulated across three conditions (plastic, paper, ceramic), participants may not have clearly differentiated between paper and plastic based solely on images. The visual format, where the plate materials were only viewed in images, could have blurred perceived distinctions between disposables, which weakens the potential effects. In real-life dining context where tactile and weight differences are experienced these distinctions might be stronger.

Fifth, the effect size observed were small and the total variance explained by the models was relatively low (approximately 2%). This suggests that additional unmeasured variables may also be important in shaping food perceptions.

Suggestions for future research

While this study offered important insights, it also opens several possibilities for future research. First, while food palatability was used as a proxy for food waste behaviour – based on strong evidence linking the two – future research could also focus on directly measuring actual food intake and plate waste rather than relying on a perceptual proxy. This can provide stronger evidence on the link between environmental cues and food-related behaviour. Additionally, this study can be complementary to other prior research on plate waste. For instance, the work of Puntanen (2025), explored the drivers of plate waste (personal, situational and social factors) and potential reduction strategies in a university buffet context. Future research could combine these perspectives by examining how both material cues (such as plate type) and contextual factors – such as buffet layout, food information clarity, and social dining

dynamics – can together shape food evaluations and waste behaviour. Eventually, future interventions could build on both approaches by combing improvements in tableware design with situational adjustments to dining environments.

Second, in future research it would be interesting to replicate these findings in a more real-life dining settings, where the sensory interaction with the food, plate and participant is higher. For example, using real meals, physical plates, a real-setting would strengthen the ecological validity and allow for better understanding of how plate material affect food perceptions and behaviours. Perceived food palatability is already a challenging construct to measure solely through survey methods, and this even more difficult when trying to measure actual food waste behaviour. Such behaviours are best captures in a more realistic context, either through controlled experimental settings or in naturalistic environments such as canteens or restaurants. In these real-life settings it would perhaps be interesting again to look at the congruency between food type and plate material can influence food evaluation and behaviour. Other interesting approaches for future research could be: What if participants could decide for themselves how much food they will serve on their plate? What if you give them the option for a doggy bag afterwards?

Third, the study only focused on consumer associations with plate material, it is perhaps also interesting to dive deeper in the usability of different plate materials. In the qualitative Study 1, participants shared their experience with disposable plates and their usability, where they indicated that this influenced how they evaluated the food itself and the overall. experience.

Fourth, it also interesting to expand the study to include a broader range of materials such as other disposable materials (bamboo) or permanent plates (glass, porcelain). Or, measure associations in a different way. In this study, associations are directly asked to participants. However, associations can also be measure using for instance Implicit Association Tests (IAT). This measured automatic associations without asking directly, here participants should quickly sort words/images, and the reaction times reveal how strongly two concepts are linked.

Fifth, the conceptual model could be expanded and refined. The exploratory variables in this study: hedonic expectations, memories, habits, perceived exclusivity, which were excluded from the analysis, were measured with only a single item. In future research, it is perhaps interesting to develop multi-item scales for these constructs. Moreover, future research could explore contextual fit more systematically. This study suggested that the appropriateness of plate material depends on dining context: permanent plates were expected in structured, seated meals, while disposables were accepted in casual, dynamic settings. Future studies could experimentally manipulate dining context to explore whether contextual appropriateness moderates the effect of plate material on food perception and waste. Or at last, individual differences can be explored – such as environmental values, eating styles, or health consciousness – to help identify which consumers are most sensitive to plate cues.

Lastly, the potential of plate material as behaviour intervention is interesting to further explore. Subtle cues, such as using permanent plates or incorporating reminders that plates require cleaning (“this

plate will be washed after use"), could nudge consumers toward more mindful eating and reduced waste without overly restricting choice. While not a traditional nudge per se, tableware design could function as a soft intervention that encourages greater food appreciation and responsibility. Future research could experimentally test the effectiveness of such interventions in different food service environments.

Conclusion

This thesis explored how plate material influences perceived food palatability and how underlying mechanisms of automatic association may explain this effect. The study found that ceramic plates led to higher perceived food palatability than plastic, and this effect was mediated by sensory appeal, food pleasure, perceived food quality, and purchase intention. While food type did not moderate this relationship in the experiment, qualitative findings revealed one-directional incongruencies in expectations: serving main meals on disposable plates was perceived as inappropriate, whereas the reverse was generally accepted. These results show that plate material can activate implicit associations that can influence food evaluation and food-related behaviour. In this way, guiding consumption through pre-consumption expectations. Thus, this research adds a new psychological layer to the food waste debate and supports further exploration of how such cues could be translated into concrete behavioural interventions. As the world seeks to reduce food waste and promote more sustainable eating practices, it is important to understand how even small design elements – such as material cues in dining environments – influence eating experiences and behaviour. These insights offer promising, low-cost opportunities for behavioural change in both sustainability policy and foodservice practice.

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Appendices

Appendix A. Interview guide

[In English]

This research explores the associations and expectations that you have regarding the plates from which you eat. Various factors will be considered such as material type, setting, and context.

Introduction:

- Welcome participants, introduce yourself.
- Purpose of the interview: explain the study's purpose and importance, emphasising confidentiality and the voluntary nature of participation.
- Explain how the information will be used.
- Obtain verbal or written consent to proceed with interview.
- Ask for permission to record the interview. Otherwise, ask them to withdraw from the focus group.
- Warm-up question:
    - How often do you eat outside the home?
    - Where do you eat?
        - At home
        - Outside: restaurant → here lies the focus of this interview
        - At friends
        - Office/uni
        - Table/couch etc.

Associations with plate material:

- What comes to mind when you think of disposable dishware?
- What comes to mind when you think of permanent dishware?
- Do you associate any specific meaning with the materials of these plates?

Emotional associations:

- What thoughts or emotions do you associate with eating from disposable vs. permanent plates?
- How do you think your feelings about these materials affect your overall dining experience?

Dining contexts and experience (contextual associations):

- Can you recall specific events where you used disposable dishware?
- Can you recall specific events where you used permanent dishware?
- In which dining contexts would you prefer using disposable plates?
- In which dining contexts would you prefer using permanent plates?
- Do you think certain types of plates are more typical in some settings than others? And why?

Social norms, etiquettes and expectations:

- What kind of difference do you experience in different dining settings?
    - How does that influence your total eating experience?
- Is it the same in every social situation:
    - How acceptable food waste is
    - How obligated you feel to finish the food on your plate
    - How responsible you feel for food waste

Food waste:

- What do you think of food waste in general?
- In which social situation do you think you waste the most food?
- Do you think dining context makes a difference?

Mindful vs. mindless eating:

- In what situations do you eat mindful?
- In what situations do you eat mindless?
    - Give moments

General questions:

- To what extend do you think the type of plate material influences how you consume and treat the food on your plate, and whether waste is acceptable?

Closing:

- Final thoughts?
- Thank your participants:
    - Thank the participant for their time and insights.
    - Again, remind them that their contribution is anonymous.

[In Dutch]

Dit onderzoek richt zich op de associaties en verwachtingen die je hebt met betrekking tot de borden waarvan je eet. Hierbij kijken we naar verschillende aspecten, zoals het type materiaal, setting en context.

[Indien gepaster: gebruik het woord ‘u’ in plaats van ‘je’]

Introductie:

- Verwelkom de deelnemer, stel jezelf voor.
- Doel van het interview: leg het doel en belang van het onderzoek uit en benadruk de vertrouwelijkheid en vrijwilligheid van deelname.
- Leg uit hoe de informatie gebruikt zal worden.
- Verkrijg mondelinge of schriftelijke toestemming om het interview te starten.
- Vraag om toestemming om het interview op te nemen. Anders verzoek de deelnemer zich terug te trekken uit het interview.
- Opwarmvraag:
    - Hoe vaak eet je buiten de deur?
    - Waar eet je allemaal?
        - Thuis
        - Buitenshuis: restaurant → hier ligt de focus van dit interview
        - Bij vrienden
        - Kantoor/uni
        - Tafel/bank etc.

Associaties met bordmateriaal:

- Waar denk je aan bij wegwerp serviesgoed?
- Waar denk je aan bij permanent serviesgoed?
    - Het soort materiaal

    - Het soort eten
- Zijn er specifieke betekenissen die je verbindt met de materialen van deze borden?

Emotionele associaties:

- Welke gedachten of emoties associeer je met eten van wegwerp vs. permanent borden?
- Hoe denk je dat je gevoelens over de materialen je totale eetervaringen beïnvloeden?

Eetcontext en ervaring (contextuele associaties):

- Kun je specifieke momenten herinneren waarbij je wegwerp servies gebruikte?
- Kun je specifieke momenten herinneren waarbij je permanent servies gebruikte?
- In welke eetcontexten zou je de voorkeur geven aan wegwerp borden?
- In welke eetcontexten zou je de voorkeur geven aan permanente borden?
- Denk je dat bepaalde soorten borden gebruikelijker zijn in bepaalde settings dan andere? En waarom?

Social normen, etiquette en verwachtingen:

- Welke verschillen ervaar je in verschillende eetsettings?
    - Hoe beïnvloedt dat je totale eetervaring?
- Is het in elke sociale situatie gelijk:
    - Hoe acceptabel voedselverspilling is
    - Hoe verplicht je je voelt om je bord op te eten
    - Hoe verantwoordelijk je je voelt voor voedselverspilling

Voedselverspilling:

- Hoe kijk je aan tegen voedselverspilling in het algemeen?
- In welke situatie zou je zeggen dat je het meeste voedsel verspilt?
- Denk je dat eetcontext nog een verschil maakt?

Bewust vs. gedachteloos eten:

- In welke situaties denk je dat je bewust eet?
- In welke situaties denk je dat je gedachteloos eet?
    - Geef momenten

Algemene vragen:

- In hoeverre denk je dat het type bordmateriaal beïnvloedt hoeveel voedsel je verspilt?

Afsluiting:

- Laatste gedachtes delen?
- Bedank de deelnemers:
    - Bedank de deelnemer voor hun tijd en inzichten.
    - Herinner hen eraan dat hun bijdrage anoniem is.

Appendix B. Codebook

Hoofdcodes

Eetcontext	
Lage kwaliteit	McDonalds, frietboer etc. Gelegenheden waar eten niet zo belangrijk is Wegwerpservies
Hoge kwaliteit	Nette restaurants Eten waar veel gedachten en energie in gaat Belangrijk Feestelijk, chique, bijzonder Duur Respectvolle setting Goed eten
Staan	Bord in de hand – vasthouden Geen tafel Dynamische setting Wandelen/lopen
Zitten	Zittend eten Aan tafel zitten Goed gesprek Formele setting Simpele setting
Formele setting	Zittend Je betaalt meer voor je eten Meer genieten van je eten/waarderen van je eten Normale portiegrootte

	Iets meer nadenken
	Vaker je servetje gebruiken
	Rustiger eten
	Bewuster eten
	Statische setting
	Respectvolle setting
	Net gedragen
Informele setting	Staand
	Op een kleedje – picknick setting
	Goedkoper
	Minder waarde hechten aan het eten
	‘Beter te veel dan te weinig’
	Snackbar
	Losser gedrag
	Dynamische setting
	Kan ook met je handen eten
Bordmateriaal	
Wegwerpservies	Papier
	Karton
	Plastic
	Hout
	Bamboe
	Servetjes
Permanentservies	Porselein
	Kunststof
	Keramiek
	Plastic
	Steen
	Glas
	Aardewerk
Wegwerpservies - associaties	
Algemeen	Duurzaamheid
	Snel eten
	Minder zelf in de hand wat je eet
	Eten omdat het er staat
	‘Van alles wat proberen’
	‘Beter te veel dan te weinig’
	Tafelmanieren
	Het bord vergaat
	Meerdere keren opscheppen
	Informele setting
	Alles meer bij elkaar gegooid
	Heeft geen vaste portie
	Mening van anderen

Negatief	Sfeerloos
	Smakeloos: eet niet lekker
	Oncomfortabel
	Zwak/wiebelig: eten kan zo vallen
	Wekig: eten trekt in het bord
	Minder genieten
	Goedkoop
	Onhandig + niet praktisch
	Armoedig/weinig luxe
	Gemakzuchtig
	Niet fijn
	Lelijk
	Mindere kwaliteit
	Hoe het voelt in de mond
Positief	Gemak + praktisch
	Handig voor in het OV
	Minder afwas/geen afwas
	Snel weg
Soort servies	Bestek
	Bekertjes
	Rietjes
	Kopjes
	Servetje als bord
	Pizzadoos als bord
Wegwerpservies - eetcontext	
Grote groepen	Feestjes
	Diners op het werk
	Eindejaarsbijeenkomst
	Vergaderingen/bijeenkomsten met externen
	Personeelskantine (kantoor)
	Verenigingsactiviteit
	Kinderfeestje
Ergens buiten	Barbecue
	Picknick
	Fietstochten
	Straatfeest
	Tuinfeest
	Festivals
	Koningsdag
	Bij het meer
	In een park

	Zomer
Evenementen	Van de uni
	Informelere momenten
	Beurzen
	Exposities
	Potluck
Overig	Op het werk
	Vliegtuig
	Afhaal: friettent, fastfood, de Chinees
	Gelegenheid waar eten niet zo belangrijk is
	To-go: in het OV (op het station)
Permanentservies - associaties	
Algemeen	Gevarieerd/uiteenlopend
	Serieus
	Formele setting
	‘Vast bord’
	‘Echt bord’
	‘Normaal’ bord
	Herinneringen
	Tafelmanieren
	Respectvolle setting
	Huiselijke sfeer
	Duurder
	Vaste/normale portiegrootte
	Belangrijk
Negatief	Niet handig voor in het OV
	Kwetsbaar
Positief	Sociale setting
	Chique
	Mooi aangekleed
	Lekker eten
	Voorbereid eten: zit meer werk in
	Meer genieten: ziet er lekker uit
	Oogt stevig
	Goed
	Prettig en fijn
	Feestelijks
	Hygiënisch
	Praktisch
	Verzorgd
	Makkelijk eten

	Van meer waarde
Permanentservies - eetcontext	
	Thuis
	Restaurant
	Op kantoor/op het werk
	Bij mijn ouders
	Bij vrienden
	21-diners
	Formele settings
	Met familieleden, met kerst, met feestdagen
	Iets feestelijks
	Iets belangrijks
Voorkeur	
Permanentservies	Altijd (als het kan)
	Bij zittend eten
	Als het om sfeer draait (gezelligheid)
Wegwerpservies	Dynamische setting/staand
	Niet voor de gezelligheid
	Praktische redenen
	In het OV
	Als je het moet vasthouden
	Geen beschikbaarheid van afwasmachine
	Als jij trakteert/feestje geeft
	Als het niet anders kan
Het soort eten	
Wegwerpservies	Saté met brood en pindasaus
	Barbecue-eten
	Voor direct gebruik
	Taartje/gebakje
	Gemaksvoedsel
	Ongezond/junkfood/vet
	Wit stokbrood met dipjes
	Pastasalades
	Picknick-eten
	Kant-en-klaar eten
	Eten waar minder energie in zit
	Goedkoop
	Rauwkost
	Wrap hapjes
	Simpel/makkelijk
	Functioneel eten
	Afhaaleten
	Feesteten

	Croissantjes
Permanentservies	Aardappelen Groente Vis Vlees Pasta Rijst Lux eten Lekker eten Gezond eten Meer tijd, gedachten, moeite en energie in het eten Meer uitgebreid gekookt eten Complexere maaltijden Duurder eten Echte recepten Uiteenlopend/gevarieerd
Verplichting om het op te eten	
Bord leeg eten	Principe: je eet je bord leeg In een restaurant + met anderen: gênant Eten is lekker Formele setting: je betaalt meer Geen optie voor doggy bag Tegen voedselverspilling (zonde)
Eten laten staan	Als je alleen bent In een restaurant: er wordt te veel opgediend Informele setting: niet veel voor betaalt Omgeving vindt het niet erg Eten is niet lekker Eten trekt in het bord [wegwerp] Het is te veel Optie om het te bewaren (zoals thuis) Als je vol zit
Wegwerpbord	Je eet meer Eten trekt in het bord Je eet omdat het er staat ‘Hup, alles tegelijk met het bord wegkieperen’
Permanentbord	Minder sociaal geaccepteerd

	Eten is vaak lekkerder
Bewust vs. gedachteloos eten	
Bewust eten	Thuis
	Restaurants
	Geen junkfood
	Op permanentservies eten
	Op een mooi bord eten
	Genieten van je eten
	Eten kost meer dan gemiddeld
	Zelf koken
	Rustig/langzaam eten
	Met anderen eten
Gedachteloos eten	Barbecue
	Honger
	Multitasken
	Veel gaande in de omgeving
	On-the-go
	Eten is niet lekker
	Tijdsdruk
	Geroutineerde maaltijden
	Snel eten
	In je eentje eten
Voedselverspilling	
Wanneer	Eten is niet lekker
	Dynamische settings > statische settings
	Geen optie om het te bewaren
	Vaak op feestjes
Tegen voedselverspilling	Geven aan iemand anders
	Bewustwording
	Doggy bag
	Flexibel
Weggooien	Wegwerp > permanent
	Wegwerp: makkelijker en sneller
	Buitenhuis: logischer en begrijpelijker
Schuldgevoel	

Appendix C. Complete results of Study 1

The mention frequency of each plate material

As outlined in the methodology of Study 1, the terms "disposable" and "permanent" plates were deliberately used without predefined definitions, which allowed participants to form their own associations with it. The interview responses revealed that among disposable plates, plastic was the most frequently mentioned material, followed by paper and cardboard. Wooden and bamboo plates were referred to only a few times, which suggests that they are perceived as less common or niche alternatives. This indicates that plastic and paper plates are the dominant associations when discussing disposable tableware. For permanent plates, ceramic and porcelain emerged as the most frequently mentioned materials. Some participants also referenced to hard plastic, though this was primarily associated with children's tableware, as participant six described it as "childish." Additionally, glass and stone plates were mentioned in the context of formal or aesthetically refined dining experiences.

The frequency of references to different plate materials highlights where associations are strongest. Interestingly, disposable plates were mentioned far more often than permanent plates. Perhaps reflects this stronger opinions and associations with disposables. While ceramic and porcelain were seen as the "standard", “normal”, “how it should be” choice for dining, disposable tableware evoke more distinct perspectives. This supports the theoretical framework’s emphasis on associative networks and consumer categorisation; the idea that plate material influences perceptions of meal quality, appropriateness, and waste behaviours.

Eating context: static vs. dynamic settings

Participants associated disposable and permanent dishware with two types of settings: static and dynamic. Dynamic settings were characterised by casual dining contexts where disposable dishware was common, such as barbecues, picnics, large-scale events (e.g., exhibitions), and fast-food establishments. These environments often involved standing, walking, and a lack of fixed seating, often requiring people to move while eating (n=3). Disposable dishware was acceptable and seen as practical and convenient in such informal, high-traffic situations, particularly for large groups (n=2). One participant stated: “*Holding a heavy plate, such a big plate is obviously inconvenient, then you rather want some kind of paper plate to stand with.*”, (P2). Furthermore, participants described these settings as less formal, associated with lower-cost meals (n=2), placings less value on the food (n=2), and characterised by casual behaviours, such as eating with hands instead of utensils or minimal dining etiquette (e.g., bending over, gobbling, burping,) (n=3). According to some participants, these settings also encouraged rushed, fast-paced eating, often combined with an uneasy or restless feeling (n=5).

In contrast, static settings were associated with structured and mindful dining experiences (n=1), typically involving permanent dishware, fixed seating, dining at a table, single dining space, and a

relaxed atmosphere (n=3). Participants highlighted that these formal settings encouraged more appreciative eating practices (n=2): "*I just think you enjoy your dinner more in a sitting setting.*", P3. It allowed for slower, more thoughtful consumption, proper table manners (e.g., sitting upright, using utensils, avoiding elbows on the table), and greater appreciation for the meal (n=4). Such settings, often involving higher-cost meals (n=2), were perceived as more refined, emphasising respectful behaviour (n=2), being conscious of portion sizes (n=1), and opportunities for meaningful conversation (n=2), which all contributed to a pleasant and refined dining experience.

Disposable dishware

Disposable dishware is viewed as convenient and practical in certain settings, it is generally associated with negative environmental impacts (n=6), a diminished eating experience (n=7), and social perceptions of informality or low status (n=5). Participants reflected both the perceived necessity (n=3) and the associated negative connotations of disposable items (n=7).

Environmental impact – Participants strongly associated disposable tableware with negative environmental effects, particularly regarding the use of plastic (n=6). One participant said: "*I'd always prefer a real plate, because that's simply better for the environment.*", P2. This awareness of sustainability was further reflected in comments about workplace or university policies encouraging reusable alternatives, such as a 'bring your own cup' principle (n=3).

Eating behaviour and context – It was associated to a less enjoyable dining experience (n=7). Participants feel that the food tastes less good (n=5) and that eating from disposable tableware feels rushed and informal (n=5). Additionally, the informal nature of disposable tableware was linked to less mindful eating, with participants indicating that they were less focused on their meal and more concerned with convenience. One participant explained: "*For example at a party, you use disposable plates and then everyone makes something you want to try. You're not really focused on one plate, but you are more like, oh I want to eat that and that. You just grab whatever's there.*", P5, while another added: "*It feels like eating faster and not taking time for one plate of food.*", P6.

Social and emotional associations – It was often seen as unattractive, low-quality, and associated with informal or 'cheap' dining experience (n=5). One participant noted: "*If you're eating from a plastic plate, I don't expect high-class guests.*", P6, while another commented on the lack of formality: "*With disposable plates, table manners are a bit thrown out the window. With a real plate, you have more of a proper meal*.", P2. This reflects a perception of disposable tableware as "cheap" or "low status". Some participants also described the negative sensory qualities of disposable tableware, such as its instability, easily damaged and tendency to become flimsy when wet: "*It feels weak, like it could fall or blow away*.", P3.

Practicality vs. preference – While everyone expressed negative views about disposable tableware, they also acknowledged its convenience (n=3). In some contexts, such as outdoor events or informal gatherings, disposable items were seen as practical and necessary: "*With disposable items, you*

don't have to worry about washing. ", P6. However, even in these cases, participants often preferred more sustainable options such as reusable, multi-use plates, high-quality materials or even pizza boxes as plates, which they find more acceptable.

Consumption and waste – Disposable plates are associated with overeating, especially in informal settings like picnics or parties, where people tend to take multiple servings, and want to avoid food shortage for their guests (n=3).

Disposable dishware: eating context

These contexts are often characterised by informal settings, large gatherings, and events where practicality, high turnover, and a lack of dishwashing facilities make disposables an attractive choice. Examples mentioned in the interviews:

- Outdoor events – Social gatherings such as festivals, barbecues, picnics, or gatherings at parks and lakes.
- Work-related event – Business meetings, large group lunches, and conferences.
- Food service settings – Fast food outlets, snack bars, and takeout services with high volumes of customers and the need for rapid service.
- Convenience and necessity – Occasions where washing dishes is impractical due to lack of facilities. Also, travel-related contexts, like eating on a plane or public transport, where food is not the main focus.
- Specific events – University events, potlucks, informal celebrations such as King's day, where disposables help manage large groups efficiently.

Permanent dishware

Most participants associated permanent dinnerware with traditional, formal, and high-quality dining experiences (n=4). Permanent plates were perceived as representing 'normal' eating, and often expressed a sense of "what it should be" (P4) (n=6). It represents a more polished, serious dining experience which is often linked with a better, more refined atmosphere and higher quality food (n=4). It was also linked to a more enjoyable, festive dining experience (n=4), which contributed to the overall perception of the meal.

Aesthetic factors were also a determinant in shaping participants' associations with permanent dishware. As permanent dishware increased the aesthetics of a meal according to several participants (n=5), it also encouraged more mindful eating. As one participant explained: "*I think you also enjoy your food more when you eat it on a normal plate and think a bit more about what you're eating*.", (P2).

In terms of value, permanent dinnerware was viewed as adding prestige to a meal, especially in higher-end or special dining contexts it was rather crucial (n=4). One participant reflected: "*The more festive the food and the more expensive the restaurant, the more you expect high-quality materials. At the Hilton, I would never expect them to serve anything on cardboard*.", P4. Another participants also

mentioned the mismatch between disposable plates and formal occasions. As this participant put it: "*When I enter a fairly expensive restaurant, I also expect them to have nice and appealing tableware. Otherwise, I don't find it acceptable*.", P7. Moreover, one participant shared that porcelain dinnerware often carried also personal significance: "*And with porcelain tableware, I also feel more like I've received pieces from my parents' home, so they carry memories.*", P4.

While permanent dinnerware was viewed positively in terms of aesthetic and emotional appeal, some practical considerations were also noted. A few participants pointed out that permanent plates might not be as convenient in certain settings, such as when traveling or in public spaces. Nevertheless, for home dining, permanent dinnerware was preferred, particularly when a dishwasher was available. Furthermore, the preference for permanent dinnerware was found to be stronger during evening meals, where dining was viewed as more formal and meaningful: "*The preference for permanent tableware is greater at dinner than at breakfast or lunch.*", P6.

Permanent dishware: eating context

The use of permanent dishware is associated with a variety of eating contexts which spans from both every day and special occasions. Some participants highlighted that eating from permanent dishware is considered the norm, and therefore does not necessarily have to mean special occasions. Within the home, permanent dishware is often linked to a "huiselijke sfeer," or a homely and comfortable atmosphere. In contrast, outside the home, permanent dishware is frequently associated with more formal or important occasions. These include dining in restaurants, attending festive events, or celebrating important moments such as Christmas, holidays, family gatherings, or 21-diners. This distinction suggests that while permanent dishware is a staple of everyday life within the home, its use in external settings often signals a shift toward more ceremonial or meaningful experiences.

Disposable vs. permanent dishware: preferences

All participants do not prefer disposable tableware unless practical circumstances determine otherwise. Participant's preferences regarding disposable versus permanent tableware reveals a clear distinction between practical and social settings. Overall, while permanent tableware is favoured for dining experiences and social gatherings, disposable items are acceptable in certain practical, casual, or large-scale situations, where convenience, mobility, and practicality are prioritised.

Social and formal settings: preference for permanent tableware – Participants preferred permanent tableware in situations where dining is associated with ambiance and social interaction in seated situations (n=7). This preference is also driven by the perception that permanent items provide a better dining experience; eating for enjoyment and atmosphere: "*When it comes to socialising, always permanent tableware.*", P1.

In practical situations: preference for disposable tableware – Disposables are acceptable when practical concerns such as mobility and ease of disposal are involved (n=6). Examples of casual or

practical scenarios are outdoor activities, standing while eating, or events involving large groups. Several participants indicated that convenience was a key factor in these preferences. One participant noted: "*Unless you're on a bike ride and there's catering along the way, then I don't mind as much. In that case, it's convenient to hold a plastic plate in your hands. You can walk to your bike, eat around it, and then throw it in the trash.*", P1. Similarly, another participant explained: "*Disposable tableware is preferred when you need to hold something in one hand while standing.*", P3.

Environmental concerns – Although some disposable tableware is preferred in many practical settings, some participants expressed a desire to avoid it due to environmental concerns, particularly when alternatives are available. One participant stated: "*Avoid disposable when possible*.", P6. However, the necessity of disposables in certain circumstances, such as festivals or parties with limited washing facilities, was acknowledged: "*When there is no water I understand why you would opt for disposable tableware.*", P4.

Personal preferences – Participants noted the convenience of disposables, including not having to clean up afterward, and in certain cases, like giving a party, they see it as the more suitable option due to ease of handling and cost-effectiveness (n=3).

Large groups – In scenarios involving large groups, where practicality and high turnover are key, disposable tableware was seen as more appropriate (n=2). In such settings convenience of disposables outweighs concerns about sustainability. One participant explained, "*I think when dealing with large groups of people with high turnover, I can imagine choosing cardboard or plastic waste*.", P4. Besides, P2 and P5 have the perception that at a party you are guaranteed to waste food because of the principle 'rather too much than too little'.

Disposable vs. permanent plates: what kind of food is expected

The findings demonstrate that disposable plates are primarily linked to convenience, mindless eating, and unhealthy food, while permanent plates are associated with health-conscious choices, more complex meals, and greater intentionality in meal preparation.

Disposable Plates – Disposable plates were associated with convenience, informal settings, and the consumption of less healthy food options (n=7). Participants linked it to foods that are easy to prepare (n=4), quick to consume (n=4), or eaten with little intentionality (n=2). Examples include fries, pizza, cake, pie, sate, white baguettes with dips, croissants, and barbecue food. These were characterised as "convenient" or "ready-made" foods that require minimal preparation or effort. Participants have the perception that meals consumed on disposable plates tend to have lower nutritional value (n=5). One participant described these foods as "less healthy and more processed" options (P2).

Permanent Plates – In contrast, permanent plates were associated with healthier, higher-quality, and more complex meals. Participants linked permanent plates to foods requiring more preparation. They perceived these plates as suited for more time and energy-consuming food. One participant stated, meals served on permanent plates often had "more effort put into the food" (P2). It was more linked to

"real, proper meals" rather than snacks or quick lunches. One participant said: "*It doesn't have to be fancy – it can also be very simple – but it's more about the time and effort you put in, and that it's more a dinner meal than just a snack or lunch food.*", P6.

Feelings of obligation

The social aspect of finishing a meal emerged as the most significant factor influencing participants' food consumption behaviour (n=5). Leaving food uneaten can signal that the meal was not enjoyable, which could be seen as disrespectful to the person who prepared it. One participant explained, "*When you're visiting people, friends, or family, you're expected to finish your plate because otherwise, they might think you didn't like the food.*", P5. This social responsibility to finish a meal often stems from a young age, as participants described learning early on that leaving food behind is unacceptable (n=3). The role of family socialisation plays a role here, such as parents encouraging children to finish their food. For instance, one participant said: "*I also tell my children to clean their plate more because otherwise, I have to scrub and scrape it. Just eat that last bit*.", P7.

Participants also discussed strategies to avoid wasting food while still respecting social norms. Serving smaller portions, for example, was seen as a practical way to ensure that the food on one's plate could be finished (n=2). Additionally, in settings such as restaurants, the option of requesting a doggy bag provided an acceptable solution for managing leftover food without offending anyone (n=3). One participant also mentioned: "*You paid for it, so I'm inclined to finish it in a restaurant, whereas at home you simply would have served yourself less. That's the other side of food waste.*", P4.

In formal settings, where social expectations are higher, participants felt a stronger obligation to finish their meals. In contrast, informal settings often involve the use of disposable items, which are perceived as more easily discardable: "*If I have a porcelain or ceramic plate, I would feel more inclined to finish the food, but with a plastic plate, I think, well, you can just throw it away.",* P1.

Mindless vs. mindful eating

Mindless eating is more common in environments focused on distractions, time constraints, or convenience, while mindful eating is more common in contexts that emphasise effort, distinctiveness, or social connection.

Mindless eating behaviours – They were characterised by the consumption of unhealthy or unappetizing food (n=2), feelings of hunger (n=2), time pressure (n=3), multitasking (5), environmental distractions (n=5), eating in solitude (n=2), and repetitive or familiar food settings (n=2). As one participant described: "*When you're really very hungry, you just scarf it down.*", P2. Another participant explained, "*For example, in the mornings I sometimes eat my breakfast very quickly and quite mindlessly, because I need to leave the house quickly.*", P4. In such situations, speed and convenience often took priority over the enjoyment of the meal. These factors commonly led to a faster eating pace, which was associated with mindless eating and a lack of attention to the food being consumed.

Mindful eating behaviours – They were characterised by dining in the presence of others, in relaxed settings with minimal distractions, and with a greater emphasis on social interaction (n=5). These behaviours were also linked to special meals or occasions that stood out from routine dining experiences, as well as to situations where the food was perceived as expensive or required significant effort to prepare. One participant reflected: "*When I go out to eat, I want to have something special, something that makes me think, 'I couldn't make this at home'.*", P1. Another participant observed: "*I think when food costs more than average... you want to enjoy it more and appreciate it.*", P3. This shows the connection between perceived value or effort and a more mindful engagement with food. Social contexts also played a crucial role, as one participant explained: "*When I'm with others and engaged in conversation, I eat much more slowly. It's also more enjoyable.*", P6. Thus, the social factor and meal duration, such as dining in the company of others or enjoying a relaxed meal, encourage a slower and more deliberate approach to eating.

Food waste

Participants reported that the main reason for wasting food is their perception of its taste; food that is not considered enjoyable or appetizing is more likely to be discarded (n=4). Additionally, food waste tends to occur more frequently in dynamic and informal social settings, such as parties, barbecues, and picnics, where options to save leftovers are often unavailable (n=3). These contexts allow for a more relaxed atmosphere, which, in turn, encourages a more casual approach to food consumption and disposal. For participants it felt easier to discard food in these contexts.

Several participants expressed stronger awareness of the environmental impact of food waste and strong intention to reduce it (n=5). For example, give their leftover food to others (n=2), requesting doggy bags at restaurants (n=3), saving leftovers for later consumption (n=2), and adopting a more flexible approach to meal choices to prevent waste (n=1). One participant emphasised the importance of thoughtful planning: "*I try to think about how much to buy and prepare, making sure it matches the number of people and how much they typically eat.*", P7. These strategies reflect a deliberate effort to align individual behaviours with waste reduction goals.

Participants indicated that they discard more food when using disposable plates (n=4). This was due to the convenience and ease of discarding both the plate and leftover food together. As one participant noted: "*It's easier to throw it away, like I said, that plastic plate can also be thrown away. If you don't like the food, then boom, you can toss everything away along with the plate.*", P1. Similarly, P7 about disposable items: "*At a party like that, you just toss everything together. Boom. And then you move on.*" Another participant said: "*Because then I think, I don't want this anymore, I can throw it away, and then the problem is gone. It can go in the trash, and that's it.*", P3. Especially in outside and social situations, food waste was perceived as more acceptable and understandable. One participant explained: "*With disposable plates, food waste feels more acceptable because everything can go straight into the trash. And you're already in a situation where you're going somewhere else afterward, and you*

don't want to do the dishes.", P6. The temporary and perishable nature of such settings, combined with the practicality of disposables encouraged food waste.

In contrast, food waste was seen as less acceptable in home environments, where saving leftovers for later consumption was easier and more habitual (n=4). At last, in large gatherings, participants felt less concerned about food waste. One participant explained: "*At a picnic or a large gathering, the rule is more: rather too much than too little which leads automatically to more being thrown away.*", P5.

Guilt

The findings suggest that feelings of guilt related to food waste are shaped by who is responsible for the food (n=3), the inability to preserve leftovers (n=3), the effort and cost of preparing the food (n=2), and the context in which food is consumed (n=3).

Who is responsible for the food – Several participants identified that those who control the purchasing, preparation, and portioning of the food bear the primary responsibility for the subsequent food waste that occurs (n=3). For instance, in the context of a party or birthday celebration, the host, who manages the purchasing and preparation of the food, is perceived as responsible for any resulting waste. Similarly, in a restaurant setting, the chef is seen as accountable, as they determine the portion sizes served to guests.

The inability to preserve leftovers – One participant explained: "*With disposable plates and the setting you're in, you often can't store the leftovers. So automatically, if you use disposable plates, you feel more guilty because if you leave something, it's probably not going to be saved, and then you have food waste.*", P3. The inability to preserve leftovers which is often the case with disposable plates contributes to the perception of wastefulness.

The effort and cost of preparing the food – Participants expressed that food waste in snack bars was viewed as less significant compared to restaurants (n=2): "*Generally, less value is placed on the food at a snack bar compared to a restaurant, where people have spent more time preparing it. It's also more expensive to buy and prepare. So, I'd say it's less problematic to throw away food at a snack bar.*", P3.

The context in which food is consumed – Social settings such as birthday parties, picnics, or potluck gatherings were linked to feeling less guilty (n=3). As one participant shared: "*It's something that just happens, and you have less control over it*.", P6. In these contexts, the collective nature of the event and the reduced individual responsibility diminished feelings of guilt surrounding food waste.

Appendix D. Questionnaire outline

Questionnaire

You are invited to participate in a study conducted by a Master's student at Wageningen University. Please answer the following questions based five food images. For each statement or questions, select the option that best reflects your opinion or experience. The questionnaire will take approximately 5 minutes.

Your participation is voluntary, and you can withdraw at any time. Your responses will be confidential and securely stored, with no identifying information used. By clicking "yes," you confirm that you have read and understood this information, and you voluntarily agree to participate, confirming you are at least 18 years old.

Thank you for your participation!

Warm regards,

Anne-Ying Telders

Did you read the text above and agree to the use of your data?

yes/no

From 0 (not hungry at all) to 100 (extremely hungry):

COV: I am hungry right now.

Please answer the following questions based on your expectations of this food, from 0 (not at all) to 100 (extremely)

Sensory Appeal:

SEN1: This food looks visually appealing.

SEN2: I expect this food to have a pleasant aroma.

SEN3: I expect this food to taste good.

SEN4: I expect this food to feel pleasant in my mouth.

Please answer the following questions based on your expectations of this food, from 0 (not at all) to 100 (extremely)

Food pleasure:

FP1: This food looks like it would be comforting and rewarding to eat.

FP2: I expect to feel satisfied after eating this food.

FP3: I anticipate that eating this food will be pleasurable.

Please answer the following questions based on your expectations of this food, from 0 (not at all) to 100 (extremely)

Perceived food quality:

QUL1: I expect this food to be of high quality.

QUL2: I expect this food to be fresh and well-prepared.

QUL3: The way this food is served makes it feel like a premium meal.

Please answer the following questions based on your expectations of this food, from 0 (not at all) to 100 (extremely)

Health Perception:

HP1: I expect this food to be healthy.

HP2: I expect this food to be suitable for a health-conscious diet.

Please answer the following questions based on your expectations of this food, from 0 (very unlikely) to 100 (very likely)

Purchase Intention:

PI1: I would consider purchasing this food if I saw it in a restaurant, grocery store, or online.

PI2: I am likely to purchase this food if given the opportunity.

Please answer the following questions based on your expectations of this food, from 0 (not at all) to 100 (extremely)

Food palatability:

PAL1: I believe this food will taste good.

PAL2: This food looks appetizing to eat.

PAL3: This food seems like something I would enjoy eating again.

PAL4: I would recommend this food to others based on its appearance and expected taste.

Please answer the following questions based on your expectations of this food, from 0 (not at all) to 100 (extremely)

Additional separate items (exploratory analysis):

Hedonic expectations: I associate this food with happiness and enjoyment. (Andersen et al., 2021)

Memories: This food reminds me of positive memories (Hyldelund et al., 2024)

Habits: This food matches with my usual eating habits and preferences. (Hyldelund et al., 2024)

Perceived exclusivity: I expect this food to be expensive. (Imtiyaz et al., 2021)

Please answer the following questions based on your expectations of this food, from 0 (very unsuitable) to 100 (very suitable)

Context (Imtiyaz, 2021; Hyldelund, 2024)

CON1: I would enjoy eating this food with others. (Imtiyaz, 2021)

CON2: I would eat this food in a formal setting. (Imtiyaz, 2021)

CON3: I would eat this food in a casual setting. (R)

CON4: I would enjoy eating this food alone. (Hyldelund, 2024) (R)

Please answer the following questions based on your expectations of this food, from 0 (strongly disagree) to 100 (strongly agree)

Environmental concerns (Mason et al., 2018):

ENV1: I prefer eating on sustainable dishware rather than disposable plates.

ENV2: Using permanent plates makes me feel like I am making an eco-friendly choice.

ENV3: I am concerned about the environmental impact of disposable tableware.

ENV4: The material of my plate affects how eco-friendly I perceive the food to be.

Please answer the following questions based on you expectations of the food, from 0 (never) to 100 (always)

Mindful vs. mindless eating:

MIN1: I consciously notice the appearance, smell, and texture of my food before eating it.

MIN2: I tend to eat food quickly without focusing on the sensory experience. (R)

MIN3: I often eat while distracted, without paying much attention to my food. (R)

Checks:

CH1: Please shift the bar to "100 (extremely much)" to show you are paying attention.

CH2: What material do you think the plate was made of, on which you got to see the food? [plastic, paper, ceramic]

Demographics:

What is your gender? [male, female, non-binary/third gender, prefer not to say]

How old are you?

What are your dietary preferences? [no dietary restrictions, vegetarian, vegan, gluten-free, lactose-free, other (please specify)]

What is the highest level of education you have completed?

[No formal education, primary education (completed primary school), secondary education – vmbo, secondary education – havo or vwo, Mbo (secondary vocational education), Hbo (higher professional education – Bachelor's degree), University (WO – Bachelor's degree), University (WO – Master's degree), Doctorate or PhD (completed a doctoral degree)]

Appendix E. Use of AI Tools in my thesis

During the writing of this thesis, I used ChatGPT (developed by OpenAI) as a supportive tool to help me with different stages of the research and writing process. It was used in the following ways:

- Brainstorming: In the early stages of the thesis, I used ChatGPT to explore potential research topics, formulate research questions, narrow the research scope, and shape the theoretical foundation. In later stages, I also used ChatGPT to generate ideas for potential questions for both the qualitative interviews and the quantitative survey phase.
- Writing and rephrasing: ChatGPT occasionally helped me to rephrase or clarify sections of text, especially to improve academic tone, grammar, and overall clarity.
- APA citation: I consulted ChatGPT to verify APA 7th edition citation for some sources. However, it is important to note that all references were managed and inserted via EndNote, a reference manager.
- Data analysis guidance: I used ChatGPT to help me with choosing the right statistical analyses for my design and interpret the output.