The effect of visibility and convenience of seaweed on willingness to buy

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Chapter 1. Introduction

To meet the food demands of our growing global population, it is estimated that global food production needs to increase by one to two percent annually (Tilman et al., 2011). However, this increase poses a significant threat to natural resource depletion and increases the issue of rising greenhouse gas emissions (Vermeulen et al., 2012). A major contributing factor to these problems is the high consumption of animal protein (Branca et al., 2019; Mertens et al., 2017). Therefore, it is crucial to focus on finding more sustainable alternatives to replace animal protein (Rust et al., 2020).

Seaweed, also known as macroalgae, has emerged as a promising alternative to animal protein. Seaweed species vary in protein content, ranging from 5% to 47% depending on the species and environmental conditions, with many species containing more than 15% protein (Černá, 2011). This makes the protein content of seaweed comparable to that of beef (Cherry et al., 2019). Additionally, seaweeds offer other nutritional benefits such as high fiber, mineral, and vitamin content, while being low in fat (Cherry et al., 2019; MacArtain et al., 2007). The sustainability of seaweed production is enhanced by its ability to grow without artificial fertilizers and water cleaning, and it does not compete for agricultural land like soy (Mahalik & Kim, 2014). These characteristics make seaweed a highly sustainable food source (Mahadevan, 2015).

Despite the nutritional and environmental advantages of seaweed, there are challenges associated with its safe production and consumption. It is generally believed that seaweed may contain human pathogens in concentrations similar to those in the surrounding water bodies (Blikra et al., 2021). Locations with low water quality and coastal areas experiencing heavy rainfall are more likely to have human pathogens, which can subsequently be found in seaweed (Ziino et al., 2010). Therefore, the location where seaweed is harvested or cultivated plays a crucial role in ensuring microbiological food safety (Banach et al., 2020).

Seaweed naturally contains iodine, an essential mineral. Both underconsumption and overconsumption of iodine can lead to health issues such as hypothyroidism and goiter (Blikra et al., 2021). However, increased consumption in Western countries is not expected to be harmful, as iodine deficiency is more common than iodine excess in Europe (Lazarus, 2014). Moreover, processing technology can largely control iodine levels in seaweed (Nielsen et al., 2020; Stévant et al., 2018).

Another consideration is the potential accumulation of heavy metals such as cadmium, mercury, and arsenic in seaweed from the surrounding environment (Banach et al., 2020). However, moderate consumption of seaweed is generally regarded as safe. A maximum daily dose of 5 g of dry seaweed typically poses a low risk of heavy metal poisoning (Blikra et al., 2021). This dose is significantly higher than the current consumption in the western world.

Seaweed benefits from an already established product market in East Asia, where it is consumed regularly (Chapman et al., 2015; Fleurence et al., 2012). However, in western countries, seaweed is not traditionally part of the culinary repertoire, leading to low consumption (Birch et al., 2019; Chapman et al., 2015; Palmieri & Forleo, 2020). The lack of knowledge and familiarity with seaweed pose barriers to its consumption, including consumer unwillingness to try seaweed (Losada-Lopez et al., 2021) and a lack of understanding about how to cook with it (Blikra et al., 2021; Mellor et al., 2022).

Some studies propose the development of culinary and gastronomic applications for seaweed. (Losada-Lopez et al., 2021; Palmieri & Forleo, 2020). However, likely, the development and application of culinary and gastronomic application to at-home cooking practices will take a long time, because home cooks do not have the resources and expertise of restaurant chefs.

Alternatively, a product-focused approach that involves processing seaweed into various forms such as pasta, burgers, and juice drinks has shown more favorable consumer perceptions compared to plain seaweed (Embling et al., 2022). This is in line with the finding of studies on other novel food sources, like insects (Onwezen et al., 2021).

Combining this product-focused approach with addressing the barriers to consuming plain seaweed could yield valuable insights into whether seaweed products can overcome these challenges. Two primary barriers that seaweed products could address are the lack of familiarity and the difficulty of incorporating seaweed into dishes. Familiarity plays a crucial role in preference, as evidenced by studies on insect consumption, which have shown that making insects less visible increases familiarity and liking (Blikra et al., 2021; Gumussoy et al., 2021; Mellor et al., 2022). In fact, there is a positive relationship between familiarity and liking (Hartmann et al., 2015; Tan, Fischer, et al., 2016). Studies on insect consumption utilized processing techniques to make insects less visible, resulting in increased familiarity and positive evaluations (Hartmann et al., 2015; Hartmann & Siegrist, 2016). The visibility of seaweed could explain the increase in preference between seaweed and seaweed products.

Secondly, consumers not knowing how to prepare seaweed and how to use it in a dish is another major barrier to the consumption of seaweed (Birch et al., 2018; Embling et al., 2022). Convenience foods can facilitate dietary variety without requiring extensive planning and knowledge, addressing the challenges of preparation and usage of seaweed (Beck, 2007). Convenient seaweed products are easy and quick to prepare, reducing the chances of preparation mistakes. Therefore, incorporating seaweed into convenient products may partially overcome the difficulties of preparing seaweed.

This study will focus on the dinner context, as the dinner setting is central for experimenting with new food options. Dinner is often seen as a time when individuals have more leisure and freedom to try new flavors, ingredients, and recipes. According to a study by Elzerman et al. (2011), dinner is the mealtime associated with the highest culinary exploration and diversity in food choices. Therefore, seaweed is more suitable for introducing in the dinner context. Furthermore, it is worth noting that overall, more food is consumed during dinner compared to other meals. Dinner is typically the largest meal of the day for many people. Therefore, incorporating seaweed into dinner meals can contribute to meeting the nutritional needs and adding diversity to the overall diet.

The aim of this study is to examine the extent to which invisibility of seaweed and convenience influence preference for seaweed products compared to plain seaweed. The theoretical model will include both positive and negative effects of these factors, as well as potential moderating variables. To test the model, a questionnaire with a between-subjects design will be conducted. The findings from this study will provide valuable insights into the role of invisibility of seaweed and convenience in consumer preferences for seaweed products, contributing to the broader understanding of how to increase seaweed consumption.

Chapter 2. Theoretical framework

2.1 Effect of visibility on familiarity

One of the major barriers to the consumption of seaweed is consumers' lack of familiarity with the product (Blikra et al., 2021; Gumussoy et al., 2021; Mellor et al., 2022). In western cuisine, seaweed is not a common ingredient, leading to limited exposure among consumers (Birch et al., 2019). Visual exposure is one of the most prominent ways in which an increase in familiarity can be attained (Aldridge et al., 2009).

To address consumer reluctance and enhance familiarity with seaweed-based products, it is beneficial to process the seaweed in a manner that makes it visually familiar to consumers. This can be achieved concealing seaweed in a way that renders them unrecognizable, thus making them more similar to products that consumers are already familiar with.

The concept of creating a more familiar food product by concealing ingredients has been explored in insect consumption studies, which have shown an increase in willingness to consume (Ali, 2016; Cavallo & Materia, 2018; Hartmann & Siegrist, 2016; Tan et al., 2016). However, it is important to note that while these studies argued for the influence of familiarity on willingness to consume, it was not directly tested. However, Hartmann et al. (2015) found that reducing the visibility of insects in products increased familiarity.

In the context of insect consumption, the role of invisibility is crucial. The invisibility of the insect shape was identified as the most significant predictor for liking (Cavallo & Materia, 2018). Similarly, considering seaweed products as a novel and unfamiliar food source for many consumers (Blikra et al., 2021), reducing the visibility of seaweed is expected to enhance familiarity and, consequently, increase its acceptance among consumers.

H1: The visibility of seaweed negatively influences familiarity with the seaweed product

2.2 Effect of familiarity on willingness to buy

Familiarity plays a crucial role in consumer behavior and willingness to consume. Specifically in the context of food consumption, familiarity refers to a consumer's prior knowledge and experience with a particular food, which in turn can shape their perception and behavior towards it (Aldridge et al., 2009).

Individuals have a general tendency to like familiar food. This preference is argued to have evolutionary roots. Humans possess an inherent inclination to avoid unfamiliar foods as a protective measure against potential food poisoning (Dovey et al., 2008). Consequently, individuals tend to steer clear of foods that deviate from their known repertoire until they become familiar with them, which can occur through various means (Aldridge et al., 2009). The tendency to like familiar food aligns with the Mere Exposure Hypothesis, which states that "mere repeated exposure of the individual to a stimulus object enhances his attitude toward it" (Zajonc, 1968, p. 1).

Several studies have found a positive relation between familiarity and liking. For instance, Birch et al. (1987) found that repeated visual stimulation increased willingness to consume, while Raudenbush and Frank (1999) observed a direct correlation between familiarity with food and willingness to try. This study by Raudenbush and Frank (1999 has used a wide range of familiarity, ranging from foods known to almost all consumers to fictitious foods, unknown to all consumers. In a different study by Hwang and Lin (2010 familiarity was increased with flavors, appearance, presentation, and preparation. This led to greater acceptance of Asian menu items among American consumers. Moreover, research on insect consumption has consistently shown that increasing familiarity has positive outcomes, such as reducing disgust, increasing willingness to consume, and enhancing willingness to try (Gumussoy et al., 2021; Hartmann et al., 2015; Tan, Fischer, et al., 2016). Considering that insects are also new to consumers, these findings suggest that increasing familiarity with seaweed would yield similar results (Onwezen et al., 2021).

Furthermore, lack of familiarity has been identified as a key barrier to the willingness to consume seaweed (Mellor et al., 2022). This indicates that increasing familiarity specifically with seaweed is likely to yield positive outcomes.

In this study, the outcome variable will be willingness to buy instead of willingness to consume. This decision is made to simplify the model. Since both variables assess participants' positive disposition towards the product, it is expected that individuals who express a higher willingness to buy the product would also perceive it as appetizing and, therefore, have a higher willingness to consume it. Thus it is expected that both these outcome variables will obtain similar results.

Based on these considerations, the following hypothesis was formulated:

H2: Familiarity with the seaweed product positively influences its willingness to buy

2.3 Food Neophobia

Although the majority of individuals tend to prefer familiar foods over unfamiliar ones, there is variation in this preference, which is referred to as food neophobia (Pliner & Hobden, 1992). Individuals who have a stronger preference for familiar food rate higher on the food neophobia scale.

Several studies found food neophobia to negatively affect the willingness to consume seaweed (Birch et al., 2019; Embling et al., 2022; Losada-Lopez et al., 2021; Palmieri & Forleo, 2020). This is to be expected as seaweed is considered a novel food (Blikra et al., 2021). However, it remains unclear whether the influence of food neophobia on seaweed consumption would change if familiarity with seaweed was altered. It is hypothesized that food neophobia would still play a role in influencing consumption.

Pliner and Hobden (1992) found that for clearly unfamiliar foods, familiarity influences willingness to consume more strongly for consumers high in food neophobia compared to those low in food neophobia. However, it is not the case that individuals with low food neophobia prefer unfamiliar foods over familiar ones. Studies suggest that individuals with low food neophobia also have a preference for familiar foods (Pliner & Hobden, 1992; Raudenbush & Frank, 1999).

Considering these findings, the following hypothesis was formulated:

H3: Familiarity with the seaweed product influences willingness to buy more strongly for consumers high in food neophobia vs. low in food neophobia

2.4 Effect of convenience on perceived healthiness

The concept of healthiness encompasses a product characteristic that cannot be fully determined through search or experience (Grunert, 2002). Consumers cannot be absolutely certain about the exact healthiness of a product. How healthy the product appears for the consumer is formulated as perceived healthiness. Moreover, consumers frequently express confusion due to the contradictory advice regarding healthiness that they encounter in an environment abundant with food choices (Mick et al., 2004), further contributing to the uncertainty surrounding what is considered healthy. consumers rely on various product characteristics to make inferences (Plasek et al., 2020). These inferences, driven by uncertainty, time constraints and cognitive capacity, often rely on simple rules of thumb (Tversky & Kahneman, 1974).

One prominent rule of thumb is based on the concept of convenience. Foods with high convenience, also known as convenience foods, are defined as fully or partially prepared foods from which culinary skills or energy inputs have been transferred from the home kitchen to the food processor and distributor (Beck, 2007). While convenience products offer numerous advantages for consumers, concerns arise regarding the processing involved in creating them. Consumers associate the industrial processing that is performed to create convenience food with the loss of essential micro-nutrients (Costa et al., 2007) and lower healthiness (Costa et al., 2007; De Boer et al., 2005), whereas fresh, unprocessed foods are seen as healthy (Lusk, 2019).

This negative perception of processed foods is also observed in processed seaweed. In a recent study, it was found that perceived healthiness decreases when seaweed is processed (Mellor et al., 2022).

Therefore, the following hypothesis was formulated:

H4: The convenience of the seaweed product negatively influences its perceived healthiness

2.5 Effect of Perceived healthiness on willingness to buy

Perceived healthiness plays a significant role in shaping food choices (Pinto et al., 2021) When individuals perceive a product as healthy, it enhances their consumption pleasure and fosters a positive self-perception (Pinto et al., 2021). Consequently, products with high perceived healthiness receive more favorable evaluations (Pinto et al., 2021).

In the context of seaweed consumption, several studies have demonstrated that perceived healthiness has a positive impact on actual seaweed consumption (Birch et al., 2018; Palmieri & Forleo, 2022). Notably, the quantitative study conducted by Mellor et al. (2022) revealed that respondents expressed willingness to consume seaweed products when they perceived them as healthy. This finding underscores the influence of perceived healthiness on consumer acceptance and willingness to consume seaweed products.

Given the broader significance of perceived healthiness in driving willingness to consume and its specific relevance to seaweed, the following hypothesis was formulated:

H5: The perceived healthiness of the seaweed product positively influences willingness to buy

2.6 Convenience

Convenience can be seen as one of the most important product attributes, similar to price and taste (Contini et al., 2018). It refers to the characteristic of a product that requires less effort and time to use or prepare (Beck, 2007; Brunner et al., 2010; Scholderer & Grunert, 2005). Products with high convenience are often called convenience foods (Beck, 2007). These foods are often processed or ready-made to decrease the effort and time consumers have to spend to prepare them (Beck, 2007; Brunner et al., 2010; Contini et al., 2018).

Consumers appreciate the advantages offered by high-convenience foods, such as the ability to cook less and have more time for other activities (Costa et al., 2007). Users of convenience foods report that optimizing work and sports is a duty towards themselves and others, which saving time by consuming convenience foods can achieve (Costa et al., 2007). Furthermore, convenience foods are perceived as a means to reduce stress (Costa et al., 2007).

Given that convenience products are defined as products that cost less time and effort to prepare and that consumers recognize those advantages the following hypothesis was formulated:

H6: The convenience of the seaweed products negatively influences expected preparation time and effort

Additionally, given consumers pursue saving time and stress, and that convenience products can overcome barriers related to seaweed the following hypothesis was formulated:

H7: The expected preparation time and effort of the seaweed product negatively influences willingness to consume

In the context of novel foods, convenience products can play a vital role in overcoming barriers related to preparation. The adoption of novel products like seaweed is hindered by consumers' unfamiliarity with cooking methods and ingredient combinations (Birch et al., 2018; Mellor et al.,

2022). Convenience products can eliminate this problem by incorporating different ingredients that enhance the taste of the product without requiring additional time or effort for preparation. Therefore, the following hypothesis was formulated:

H8: Convenience has a direct positive effect on willingness to buy.

2.7 Cooking enjoyment

Convenience products are generally favored by individuals seeking to reduce the time spent on cooking (Costa et al., 2007). However, it is worth noting that for those who genuinely enjoy cooking, time reduction may not be a primary objective (Candel, 2001; Scholderer & Grunert, 2005). This is relevant, because the enjoyment and overall perception of cooking vary considerably (Wolfson et al., 2016). A lack of enjoyment in cooking is a significant factor driving the desire to spend less time cooking (Wolfson et al., 2016). Consequently, this leads individuals with low cooking enjoyment to be more convenience-oriented regarding food choices (Candel, 2001).

Raimundo et al. (2020) found that the purchase of convenience products was negatively impacted by cooking enjoyment, meaning that individuals who enjoy cooking are less likely to purchase convenience products. Similarly, Scholderer and Grunert (2005), found that involvement with food and cooking, which is a concept similar to cooking enjoyment, negatively influences the purchase of convenience products. It is essential to acknowledge that convenient seaweed products may not appeal to everyone. Therefore, the following hypothesis was formulated:

H9: The expected preparation time and effort of the seaweed product influences willingness to buy more strongly for people low in cooking enjoyment vs. those high in cooking enjoyment

2.8 Cooking skills

The orientation toward convenience products is influenced by consumers' traits (Brunner et al., 2010; Buckley et al., 2007) One trait that has a significant impact on the choice of convenience products is cooking skills (Brunner et al., 2010; Buckley et al., 2007; Contini et al., 2018)

Convenience products require fewer steps in the cooking process compared to non-convenience products, which reduces the likelihood of preparation mistakes (Beck, 2007). As a result, convenience products are seen as easy to prepare (Costa et al., 2007). Consequently, in several studies, it is found that cooking skills negatively affected the choice for convenience products (Brunner et al., 2010; Buckley et al., 2007; Contini et al., 2018). Therefore, the following hypothesis was formulated:

H10: Expected preparation time and effort of the seaweed product influences willingness to buy more strongly for people low in cooking skills vs. those high in cooking skills

2.9 Theoretical model

Figure 1 depicts the conceptual model of this study. Visibility and convenience serve as the experimental variables for this study. Familiarity, perceived healthiness, and expected preparation time and effort serve as mediators in the model. Willingness to buy is the dependent variable in this study. Neophobia, cooking skills, and cooking enjoyment are moderators.

Figure 1:

Theoretical model
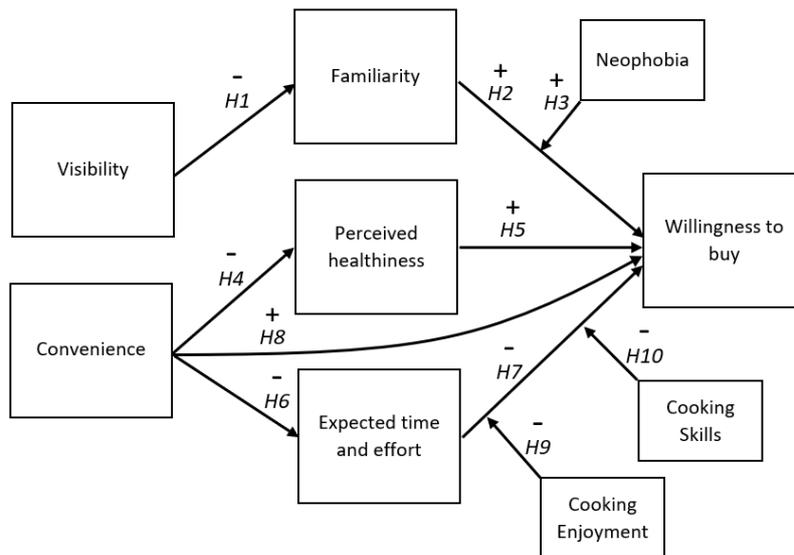
Chapter 3. Methods

3.1 Operationalization of seaweed and seaweed products

Wakame was chosen as the representative seaweed in this study because it is readily available in most major Dutch supermarkets. Additionally, wakame seaweed is used in its natural form without any processing or drying.

For the purpose of this study, seaweed burgers were selected as the operationalization for convenient seaweed products. Seaweed burgers are highly convenient as they require minimal effort and time for preparation. Furthermore, seaweed burgers can be categorized into two types: those with visible seaweed and those with invisible seaweed. Additionally, seaweed burgers can serve as a substitute for meat burgers, making them a potential choice for individuals looking to reduce their meat consumption.

3.2 Pre-test

To establish the design for the seaweed burgers, a pre-test was conducted. A total of 7 burgers were evaluated based on the following criteria: visibility of the seaweed, convenience of the seaweed burger, and the likelihood of such a product being available in a supermarket. The burger with the highest average score was chosen for the medium processing condition. Another burger, with the seaweed flakes removed, was included to represent the condition with no visible seaweed. In the pre-test, this particular burger received a low score of 1.69 out of 7 for visibility.

3.3 Participants and designs

A survey with a between-subjects design was conducted in March 2023 using the Qualtrics platform. Participant were randomly assigned to one of three conditions, which were based on 3 combinations of visibility and convenience. Convenience sampling was used to recruit participants. To ensure a sample that better represented a cross-section of society, rather than predominantly consisting of young and highly educated individuals, the survey was further distributed among acquaintances of the researcher who were older than 40 years and had an education level lower than a bachelor's degree. These acquaintances were requested to share the survey. Participants were required to be at

least 18 years old. The sample size was calculated using G*Power version 3.1.9.7 for Windows, based on 80% power, an effect size of $f = 0.3$, and an error probability of $\alpha = .05$, which resulted in a minimum of 111 in total (Faul et al., 2007).

3.4 Stimuli

Each condition only differed from the picture that was shown at the start of the survey. Wakame seaweed was used a the condition with low convenience and visible seaweed. The only text that was added was a text stating this was wakame seaweed. The product with high visibility and low convenience was called the "no processing" condition. The product with high visibility and high convenience was called the "medium processing" condition. The product with low visibility and high convenience was called the "high processing" condition. See Table 1 for each picture.

Table 1

Pictures used in each condition

No processing condition Low convenience, Visible seaweed	Medium processing condition High convenience, visible seaweed	High processing condition High convenience, no visible seaweed

3.5 Measures

Familiarity was measured using a 7-point interval scale ranging from very unfamiliar to very familiar adapted from Hartmann et al. (2015) according to their recommendation.

Perceived healthiness was measured using 5 items on a 7-point interval scale (De Temmerman et al., 2021). The questions began with the statement "I think this product is…" and the first four items were anchored by "very unhealthy" to "very healthy," "very low in fat" to "very high in fat" (R), "very low in calories" to "very high in calories" (R), and "very low in vitamins" to "very high in vitamins." The last item was measured with a 7-point Likert scale using the question "I think this product is nutritious." Two items were reverse-coded. The internal consistency of this scale was assessed using Cronbach's α, which was found to be .78.

The variable expected preparation time and effort was measured using 2 items on a 7-point Likert scale. The items included: "Preparing this seaweed burger in a dish takes a lot of time" and "Preparing this seaweed burger in a dish takes a lot of effort." The internal consistency of this scale was assessed using Cronbach's α, which was found to be .87.

Willingness to buy was assessed using a slider to indicate the amount respondents would be willing to pay for 125 grams of wakame seaweed or 2 x 85g seaweed burgers. This amount was subtracted from the reference price, which was based on typical Dutch supermarket prices mentioned for each product. The reference price for wakame seaweed was €3.29, and the reference price for the seaweed burgers was €3.99.

Food neophobia was measured using a 10-item scale on a 7-point Likert scale (Pliner & Hobden, 1992). The items included: "I am constantly sampling new and different foods" (R); "I don't trust new foods"; "If I don't know what is in a food, I won't try it"; "I like foods from different countries" (R); "Ethnic food looks too weird to eat"; "At dinner parties, I will try a new food" (R); "I am afraid to eat things I have never had before"; "I am very particular about the foods I will eat"; "I will eat almost anything" (R); "I like to try new ethnic restaurants" (R). The internal consistency of this scale was assessed using Cronbach's α, which was found to be .81. According to Pliner and Hobden (1992), 5 items were reverse-coded.

Cooking skills were measured by using 6 items on a 7-point Likert scale (Hartmann et al., 2013). The items included: "I consider my cooking skills as sufficient"; "I am able to prepare a hot meal without a recipe"; "I am able to prepare soup"; "I am able to prepare sauce"; "I am able to bake a cake"; "I am able to bake bread." The internal consistency of this scale was assessed using Cronbach's α, which was found to be .82.

Cooking enjoyment was assessed using 4 items on a 7-point Likert scale, adapted from Raimundo et al. (2020). The items included: "For me, cooking is an important way to relax"; "Meal preparation brings pleasure into my life"; "I can put a lot of my creativity into meal preparation"; "Preparing meals gives me a lot of satisfaction." The internal consistency of this scale was assessed using Cronbach's α, which was found to be .93.

In addition to the variables included in the conceptual model, several additional variables were measured.

Since expected taste is a crucial product characteristic in determining willingness to buy, it was measured similarly to Embling et al. (2022). A 7-point Likert scale was used with the statement: "This product is appetizing."

In addition to willingness to buy, willingness to consume was measured as an alternative outcome variable to check if the two would yield different results. Willingness to consume was measured using one item on a 7-point Likert scale with the question: I am willing to consume this product.

Demographic questions included: education, gender, age and nationality.

3.6 Procedure

Participants clicked on the Qualtrics link, or scanned the QR code to enter the survey. The survey began with an introduction that mentioned the researcher, supervisor, and university involved in the study. Following the introduction, respondents were familiarized with the questionnaire's procedure. Confidentiality and informed consent were explained, and an email address for any complaints or further remarks was provided. Next, participants were presented with an image of the product corresponding to one of the three randomly assigned conditions. The subsequent questions addressed the variables in the following order: familiarity, perceived healthiness, expected taste, expected preparation time and effort, willingness to consume, willingness to buy, food neophobia, cooking enjoyment, and cooking skills. A scenario was added to create a purchasing situation before willingness to pay measured. The scenario is as follows: "You visit your local supermarket at the end of the afternoon on a week day. You are cooking for yourself and a friend of yours, but you don't know what to cook yet." The questionnaire concluded with socio-demographic questions, including age, gender, education, and nationality. Lastly, respondents were thanked for their participation.

3.7 Data analysis plan

The data was analyzed using SPSS Statistics 26. A critical significance level of α = .05 was applied across all statistical analyses conducted in this study to determine statistical significance. Composite

scores for variables were created by using the mean of each item on a single construct. A Cronbach's alfa larger than .7 was used as a desirable benchmark for each construct containing multiple items (Field, 2013). The socio-demographic characteristics were compared among the different conditions . The data was checked for outliers and normality.

Before gathering data, the following analyses were planned, which may be altered after further reconsideration.

For the effect of processing on willingness to buy (*H1, H2, H4-H8)*, a one-way ANOVA was used to compare the mean differences in willingness to buy among the three processing conditions.

After a p-value lower than .05 in this ANOVA, the assumptions of normality and homoscedasticity were checked. Normality was checked by checking a histogram of the residuals for a normal distribution. Homoscedasticity was checked with Levene's test.

To test the effects of familiarity, perceived healthiness, and expected preparation time and effort a multiple regression analysis (GLM) was conducted (*H2, H5, H7)*. To test the moderating variables of neophobia, cooking enjoyment, and cooking skills in the regression model, these variables were included in the model as interaction terms (*H3*, *H8* and *H9)*.

H1, *H4* and *H7* were tested with mediation analysis to examine the mediating effects of familiarity, perceived healthiness, and perceived effort and time on the relationship between the independent variables and willingness to buy.

Firstly, the direct effect between processing and willingness to pay was estimated with bivariate regression. Secondly, the direct effect of processing and the mediators, familiarity, perceived healthiness and expected preparation time and effort was estimated with bivariate regression.

After a p-value lower than .05 in this regression, the following assumptions were checked: Linearity, homoscedasticity, normality, no multicollinearity. This was done by checking several diagnostic plots and statistical tests. A normal probability and a histogram of the residuals plot was used to check normality. A plot of residuals against the predicted values to check homoscedasticity and linearity. Variance Inflation Factor, which indicates high levels of multicollinearity, was checked, in addition to the condition index and variance proportions.

Chapter 4: Results

4.1 The sample

A total of 137 respondents started the survey. 16 respondents did not fill in the whole survey and were deleted from the dataset. Additionally, due to an error in the survey, one question measuring expected taste was skipped by a respondent and this participant was also removed from the dataset, resulting in a final sample of 120 responses. The mean age of the respondents was 33 years (SD = 15.7), ranging from 18 to 94 years, and 94% of the respondents were Dutch. The frequencies among each socio-demographic category are displayed in Table 2. A Chi-squared test of independence was performed to check if randomization errors occurred for gender: $X^2(4)=2.12, p=.71$, and education $X^2(8)=5.87, p=.66$, and a one-way ANOVA was used to test if age was equally distributed among the different conditions (F(2,117)=1.72, p=.18). From these tests, its can be concluded that there is no reason to assume that respondents were unequally distributed in gender, education and age among the 3 conditions. This means that randomization was successful.

Table 2

Descriptive statistics for the socio-demographics. Frequencies are reported. For age, means and standard deviations are reported

	No processing condition (n = 36)	Medium processing condition (n = 40)	High processing condition (n = 44)	Total sample (N = 120)
Gender				
Male	19	22	24	65
Female	17	17	20	54
Missing	0	1	0	1
Age M (SD)	31.81 (14.16)	30.48 (12.74)	36.47 (18.76)	33.08 (15.70)
Education				
Lower secondary education	2	1	2	5
Upper secondary education	3	8	6	17
Bachelor	14	15	18	47
Master	16	16	15	47
Doctoral, PhD	1	0	3	4

4.2 Items and constructs

To ensure the reliability of the measures used in the study, the Cronbach's alpha of each construct was assessed. The items that required reversing were reversed, and the Cronbach's alpha was calculated for each construct, including perceived healthiness (α = .78), expected preparation time and effort (α = .87), food neophobia (α = .81), cooking skills (α = .82), and cooking enjoyment (α = .93). All constructs had alpha values higher than .7, which is regarded as an acceptable benchmark (Field, 2013). The composite scores of each construct were created by taking the mean of the items corresponding to each construct.

The aim of this study is to shed a light what extent invisibility and convenience result in a higher preference for seaweed products over plain seaweed. To give an indication on what the effects of visibility and convenience, the difference in means of willingness to buy of visibility and convenience are depicted in Table 3. The means and standard deviations of all variables in the model are presented in Table 4. The no processing condition has visible seaweed and low convenience, the medium processing condition has visible seaweed and high convenience, and the high processing condition has no visible seaweed and high convenience.

Table 3

The effect of visibility and convenience on willingness to buy

	Visibility		Convenience	
	Visible	Invisible	Convenient	Not convenient
Willingness to buy	-0.95	-0.87	-0.92	-0.91

Table 4

Descriptive statistics for the mediators, mediators and dependent variable (on a 7-point scale unless otherwise indicated). Mean (SD) is reported.

	No processing condition (n = 36)	Medium processing condition (n = 40)	High processing condition (n = 44)	Total sample (N = 120)
Familiarity	4.33 (1.85)	3.68 (1.80)	3.82 (1.76)	3.93 (1.81)
Perceived healthiness	5.64 (0.57)	4.76 (1.05)	4.89 (0.80)	5.07 (0.91)
Expected preparation time and effort	2.69 (1.15)	2.36 (1.18)	2.02 (0.84)	2.34 (1.08)
Neophobia	2.50 (0.86)	2.66 (0.87)	2.86 (0.93)	2.68 (0.89)
Cooking enjoyment	4.63 (1.57)	4.40 (1.76)	4.21 (1.69)	4.40 (1.67)
Cooking skills	5.75 (0.79)	5.27 (1.24)	5.59 (0.97)	5.53 (1.03)
Taste	4.31 (1.62)	4.30 (1.60)	4.39 (1.53)	4.33 (1.57)
Willingness to consume	5.50 (1.42)	5.28 (1.47)	5.30 (1.30)	5.35 (1.39)
Willingness to buy (in € price premium)	-0.91 (0.76)	-0.98 (0.88)	-0.87 (0.97)	-0.92 (0.88)

4.3 The influence of visibility and convenience on familiarity, perceived healthiness and expected preparation time and effort

Due to the incomplete design, H1, H4, and H6 were analyzed separately. Three one-way ANOVAs were conducted to measure the negative effect of the dummy variable visibility on familiarity (H1), the negative effect of convenience on health (H4), and the effect of the dummy variable convenience on expected preparation time and effort (H6). Visibility had no effect on familiarity ($F(1,118)=0.24, p=.62$). This means that H1 was not supported. Convenience had a negative effect on health ($F(1,118)=23.89$, $p<.01$, $R^2=.05$) and a negative effect on expected preparation time and effort ($F(1,118)=5.79$, $p=.02$, $R^2=.05$). This means that hypothesis 4 and hypothesis 6 were confirmed. For the test of convenience on health, Levene's test was performed to assess the homogeneity of variances between the two groups. As the assumption of homogeneity was violated, a Welch test was conducted instead, which yielded $F(1,112.56)=34.27$, $p<.01$, indicating that the significance was robust.

4.4 The effects on willingness to buy

The effect of the mediators on the dependent variable and the moderators, which corresponds to the right side of the model, was tested with multiple regression. Grand mean centered variables were used to increase the accuracy and interpretability of the regression results. In model 1, the effect of familiarity, perceived healthiness and expected preparation time and effort on willingness to buy were analyzed in a model with only main effects of familiarity, perceived healthiness, and expected preparation time and effort. This model corresponded to hypotheses H2, H5, and H7 and yielded $F(3,116)=2.72, p = .05$, indicating that a model with these three variables could significantly predict willingness to buy.

In model 2, taste was included. Taste was added as a covariant, to help explain changes in willingness to buy, that are not due to variables in the model. Taste improved the model: $F\text{-Change}(1,115)=7.16, p=.01, R^2\text{Change}=.05.$ when taste was included in the model, the added value of familiarity decreased. To assess the correlation between taste and familiarity, a Pearson's

correlation analysis was conducted, revealing a correlation coefficient of r=0.34,p<0.01. This finding suggests a moderate positive relationship between taste and familiarity in the context of willingness to buy, which explain the decreased added value of familiarity.

Table 5

Predictors of willingness to buy

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Familiarity	B = .08 p = .06	B = .04 p = .33	B = .05 p = .26	B = .06 p = .20	B = .06 p = .20	B = .04 p = .32	
Perceived healthiness	B = .19 p = .03	B = .18 p = .04	B = .19 p = .04	B = .22 p = .03	B = .22 p = .03	B = .18 p = .04	B = .17 p = .04
Expected preparation time and effort	B = -.01 p = .90	B = -.02 p = .98	B = -.05 p = .55	B = -.02 p = .83	B = -.02 p = .83		
Taste		B = .14 p = .01	B = .12 p = .03	B = .11 p = .04	B = .11 p = .04	B = .14 p = .01	B = .16 p < .01
Neophobia			B = -.11 p= .24	B = -.13 p = .19	B = -.13 p= .19		
Cooking skills			B = -.03 p = .81	B = -.03 p = .81	B = -.03 p = .81		
Cooking enjoyment			B = -.09 p = .15	B = -.08 p = .21	B = -.08 p = .21		
Familiarity * neophobia			B = -.02 p = .70	B = -.02 p = .61	B = -.02 p = .61		
Expected preparation time and effort * cooking skills			B = -.03 p = .76	B = -.02 p = .85	B = -.02 p = .85		
Expected preparation time and effort * cooking enjoyment			B < .01 p > .99	B < .01 p = .99	B < .01 p = .99		
Dummy convenience				B = .15 p = .52	B = .15 p = .52		
Dummy visibility					B = -.08 p = .70		
Model fit	F(3,116) = 2.72 p = .05 R² = .07 Adj R² = .04	F(4,115) = 3.94 p < .01 R² = .12 Adj R² = .09	F(10,109) = 2.07 p = 0.03 R² = .16 Adj R² = .08	F(11,108) = 1,96 P = .04 R² = .17 Adj R² = .08	F(12,107) = 1.80 p = .06 R² = .17 Adj R² = .07	F(3,116) = 5.29 p < .01 R² = .12 Adj R² = .10	F(2,117) = 7.45 p < .01 R² = .11 Adj R² = .10
Model fit change		Compared to model 1: F Change(1,115) = 7.16 p = .01 R² Change = .05	Compared to model 2: F Change(6,109) = 0.85 p = .53 R² Change = .04	Compared to model 3: F Change (1,108) = 0.87 P = .35 R² Change = .01	Compared to model 3: F Change(2,107) = 0.51 p = .60 R² Change = .01	Compared to model 2: F Change(1,115) < .01 P = .98 R² change <.01	Compared to model 6: F Change(1,116) = 0.99 p = .32 R² Change = -.01

In model 3 several variables were added: neophobia, cooking skills, cooking enjoyment, and interaction terms of Neophobia on familiarity, cooking skills on expected preparation time, and cooking enjoyment on expected preparation time and effort. This model included *H2*, *H3*, *H5*, *H7*, *H9* and *H10*. The model yielded: F(10,109)=2.072,p=.03,R²=.16. Even though this model is significant, it does not improve the fit of the regression model compared to model 2: F-change(6,109)=0.85,p=.53. The B-values and corresponding p-values of the main effects and interaction effects of neophobia, cooking skills, and cooking enjoyments show that these values are not useful to predict willingness to buy. Therefore, hypothesis 3,9 and 10 are not supported.

In model 4, the dummy variable convenience was added to check for a direct and positive effect of convenience on willingness to buy to test H8. Model 4 was worse than model 3: F Change(1,108)= 0.87 and this was reflection in the coefficient for this variable: B=.15,p=.52. This means that there is effect of convenience on willingness to buy and that *H8* is not supported.

In model 5, visibility is added for completeness. Compared to model 3, this does not improve the fit: F-Change(2,107)=0.51,p=.60,R^2 Change=.01.

Out of the first five models, model 3 has the best fit. However, in this model expected preparation time and effort (B=-.02,p=.98) has a poor contribution to the model. Therefore this variable was deleted in model 6. This did not improve the model compared to model 2:F-Change(1,115)<.01,p=.98,R^2change .00. However, this is because the model has less predictors. Where R^2 stayed at .12, The adjusted R^2 improved by .01. Which indicates that the model is more efficient.

In model 7, the familiarity was deleted from the model, because of its non-significant effects on the dependent variable in model 6 (B=.04,p=.32). This model yields a lower R^2 in .11 compared to model 6. The adjusted R^2 is the same in .10. Additionally, all variables in this model contribute significantly to this model. Therefore, perceived healthiness and taste are therefore seen as the only two predictors to willingness to buy. Hypothesis 2 and 7 are thus not supported.

4.5 The effects on willingness to consume

Willingness to consume was measured as an alternative dependent variable in *H2*, *H3* and *H5.* It is used only as an alternative dependent variable in these hypotheses, because changes in willingness to consume due changes in preparation time and effort cannot be theoretically substantiated, as willingness to consume does not consider the aspect of preparation.

Table 6 depicts a model for the predictors of willingness to consume. Model 4 which included perceived healthiness, taste and neophobia yielded the highest adjusted R^2 with .48, which is .01 higher than model 3. F(3,116)=36.82,p<.01,R^2=.49. Both perceived healthiness and taste have positive B-values and neophobia has a negative B-value. This means that perceived healthiness and taste both have positive effects on willingness to consume. Neophobia has a negative effect on willingness to consume

Table 6

Predictors of willingness to consume

	Model 1	Model 2	Model 3	Model 4
Familiarity	B = .15 p = .25	B = .01 p = .83	B = .-.01 p = .81	
Perceived healthiness	B = .28 p = .04	B = .25 p = .03	B = .24 p = .02	B = 0.23 p = .02
Taste		B = .48 p < .01	B = .40 p < .01	B = .39 p < .01
Neophobia			B = -.63 p < .01	B = -.64 p < .01
Familiarity * neophobia			B = -.04 p = .48	
Model fit	$F_{(2,117)}$ = 4,47 p = .01 R^2 = .07 Adj R^2 = .05	$F_{(3,116)}$ = 19,14 p < .01 R^2 = .33 Adj R^2 = .31	$F_{(5,114)}$ = 21,93 p < .01 R^2 = .49 Adj R^2 = .47	$F_{(3,116)}$ = 36.82 p < .01 R^2 = .49 Adj R^2 = .48
Model fit change		Compared to model 1: F Change$_{(1,116)}$ = 45,09 p < .01 R^2 Change = .26	Compared to model 2: F Change$_{(2,114)}$ = 17,80 p < .01 R^2 Change = .16	Compared to model 3: F Change $_{(2,114)}$ = 0.28 p = .76 R^2 change < .01

4.6 Additional Analyses

For each condition, a regression analysis was performed for each variable in the theoretical model, except visibility and convenience, to investigate if some variables had effect on willingness to buy that were only existent in one condition. Additionally, the effect within conditions of familiarity and neophobia on willingness to consume was investigated.

No variables had a difference within conditions except for familiarity and neophobia. In the no-processing condition, familiarity had a significant effect on willingness to buy: $F_{(1,34)}$=11.27,p<01,R^2=.25 and on willingness to consume: $F_{(1,34)}$=5.71,p=.02,R^2=.14.

Neophobia yielded a much larger effect size on willingness to consume for the no processing condition (R^2=.55) than for the high processing condition (R^2= .10). Table 7 states the effect of neophobia on willingness to consume.

Additionally, it was tested if visibility and convenience had direct effects on willingness to buy and willingness to consume respectively. This was done by performing one-way ANOVA with visibility and convenience as factors individually. For willingness to buy, both visibility ($F_{(1,118)}$=0.01,p=.94) and convenience ($F_{(1,118)}$=0.20,p=.66) yielded nonsignificant results. For willingness to consume visibility yielded significant results ($F_{(1,118)}$=38.94,p<.01). Lower visibility lead to lower higher willingness to consume. Convenience yielded non significant results ($F_{(1,118)}$=0.60,p=0.44).

Table 7

The effect of neophobia on willingness to consume between conditions

	No processing condition	Medium processing condition	High processing condition	Total sample
Effect of neophobia on willingness to consume	$F_{(1,34)}$ = 41.71 p < .01 R^2= .55	$F_{(1,38)}$ = 27,19 p < .01 R^2= .32	$F_{(1,42)}$ = 4,65 p = .04 R^2= .10	$F_{(1,118)}$ = 45.39 p < .01 R^2= .28

Chapter 5: Discussion

5.1 General discussion

The aim of this study was to investigate the extent to which invisibility and convenience contribute to a higher preference for seaweed products over plain seaweed. While visibility and convenience do not directly impact willingness to buy, their effects on familiarity, perceived healthiness, and expected preparation are more pronounced, subsequently influencing buying and consumption intentions. This study aligned with the study of Palmieri and Forleo (2022) and Embling et al. (2022), which found that perceived healthiness increased willingness to consume and consumer acceptance respectively. Additionally, this study reveals that consumers are willing to pay more for healthy seaweed products.

Despite the absence of direct evidence for the impact of convenience, it is clearer that convenience negatively affects the perceived healthiness of seaweed products. This finding provides context to previous studies (Birch et al., 2019; Birch et al., 2018; Mellor et al., 2022) that suggest seaweed products should prioritize convenience. Furthermore, the time and effort saved by convenient seaweed products do not translate into a higher willingness to buy these products, primarily due to the negative impact of convenience on the perceived healthiness of these products.

In terms of familiarity, visibility does not have an influence on it, nor does it affect the willingness to buy and consume seaweed products. After doing additional analyses, it was found that for unprocessed seaweed familiarity does have a positive effect on increasing the willingness to buy and consume. This difference in effect can be attributed to the challenges associated with accurately defining and measuring familiarity, which has been acknowledged in previous research Hartmann et al. (2015). Initially, our hypothesis assumed that respondents would be more familiar with the seaweed burger when it had low visibility, as it resembles seaweed less, which is unfamiliar. However, it is possible that the respondents did not recognize the exact product displayed and, as a result, were not truly familiar with that specific product. This could explain the higher mean scores observed for non-processed seaweed and seaweed burgers, even though no significant differences were found. The absence of an effect of familiarity may therefore stem from the challenges associated with accurately defining and measuring familiarity. As a result, no significant effect of familiarity on the willingness to buy and consume seaweed products was observed, which is likely to have the same underlying cause. However, for the unprocessed condition, a positive effect of familiarity on the willingness to buy and consume was discovered. Based on this study, it can be concluded that familiarity with unprocessed seaweed acts as a barrier to consumption, which aligns with the findings of Blikra et al. (2021) and Mellor et al. (2022).

It is worth noting that the willingness to consume and willingness to buy seaweed products yield different results as outcome variables, as shown in Table 5 and Table 6. The variables included in the model for willingness to consume included perceived healthiness, Taste, and neophobia. These factors play a significant role in explaining the variance in willingness to consume (adjusted R^2 of 0.48). On the other hand, the model for willingness to buy only considered perceived healthiness and taste, resulting in a relatively low adjusted R^2 (0.10). This suggest that other factors play a more significant role in shaping individuals willingness to purchase seaweed products. While good taste and healthiness can persuade individuals to consume the product, they do not strongly influence the willingness to buy. These findings align with existing literature on seaweed, where studies have show a high willingness to try seaweed (Palmieri & Forleo, 2020, 2022), but low actual consumption (Birch et al., 2019; Chapman et al., 2015). Buying practices are typically repetitive and habit-based, making them less susceptible to change (Ji & Wood, 2007). However, curiosity can drive individuals to

consume novel food products, as observed in the study by Mellor et al. (2022). Quotes of respondents of this study included: "I think people would try it out of curiosity as well, because I would, I'd try it". This is similar to the findings of Tan, Fischer, et al. (2016), who found that individuals were more inclined to eat novel food products during more curious situations. Curiosity motivates individuals to consume these products, but additional factors are necessary to stimulate the decision to purchase.

The results also reveal a discrepancy between willingness to consume and willingness to buy concerning neophobia. While it was initially hypothesized that neophobia would moderate the relationship between familiarity and willingness to buy, it was found to directly influence only willingness to consume. Individuals with higher levels of neophobia demonstrate a lower willingness to consume seaweed products, consistent with previous findings in the seaweed literature (Birch et al., 2019; Embling et al., 2022; Losada-Lopez et al., 2021; Palmieri & Forleo, 2020).

Additionally, the impact of neophobia on willingness to consume varies across conditions, with less processed seaweed exhibiting a stronger negative effect. This finding suggests an alternative explanation to H3, indicating that neophobia has a more pronounced influence on products that closely resemble seaweed. The visual resemblance to seaweed may trigger neophobic responses, further diminishing liking among individuals high in neophobia. It should be noted, however, that visibility was only measured at two levels in this study. It is important to consider that participants may have experienced three levels of visibility, which will be further discussed in the limitations section.

Lastly, cooking enjoyment and cooking skills were found to be of no influence in the buying of seaweed and seaweed products. It is likely that these factors may play a role in the overall cooking experience, but they might not significantly influence the decision-making process when it comes to willingness to buy.

5.2 Limitations and further research

This study utilized an incomplete design to collect data. A complete design would have involved incorporating an inconvenient product that includes invisible seaweed. However, it should be noted that such a product does not currently exist. Invisible seaweed is typically associated with convenience because this indicates that the product has undergone processing. This processing often enhances convenience. This relationship can be linked to one of the definitions of convenience foods, which refers to 'fully or partially prepared foods in which significant preparation time, culinary skills, or energy inputs have been transferred from the home kitchen to the food processor and distributor' (Beck, 2007, p. 532). This incomplete design weakened both the validity of the tests and the interpretability of the results. For instance, the incomplete design makes it more difficult to compare the effects of different conditions directly. Without a complete design that includes all relevant conditions, it becomes challenging to determine the relative impact of convenience and visibility. Additionally, the absence of the inconvenience with invisible seaweed condition has the effect that the observed effects or differences between the conditions may be influenced by factors other than the variables of interest. Without including this condition, it becomes difficult to isolate and attribute the effects solely to convenience and visibility.

It should be noted that the manipulation of visibility in this study may not have been uniformly implemented in all conditions. The extent to which visibility varied between the wakame seaweed and the burger with visible seaweed was not quantified, thus making it uncertain whether respondents indeed perceived different levels of visibility between the two. The disparities in visibility can be observed in Table 1.

As mentioned in the discussion, there are reasons to assume that familiarity was not accurately measured, and that the measurement instruments were not fit for this research. Future research could focus on improving ways to measure familiarity.

For the operationalization of seaweed and seaweed products, this study used wakame seaweed and seaweed burgers respectively. Wakame was used for its availability in Dutch supermarkets and seaweed burgers were chosen because of its appropriateness in the dinner context, its convenience, and their potential as a meat substitute. These may not fully represent the other forms of seaweed and seaweed products available in the market. Other forms of seaweed-based products, such as snacks or sushi, may have yielded different results. Further research will have to point this out.

The study made use of a convenience sample with voluntary participation. While this sampling method provided practicality and ease in recruiting participants, it may introduce biases and limit the generalizability of the findings. The self-selection nature of voluntary participation could result in a sample that is not representative of the broader population, potentially leading to skewed results. Participants who were interested in or had positive attitudes towards seaweed products may have been more inclined to participate, which could bias the findings towards more favorable perceptions.

Additionally, it is worth noting that is was assumed that willingness to consume and willingness to buy would yield similar results. However, the findings of this study suggest otherwise. This discrepancy highlights the complexity of the decision-making process when it comes to purchasing food products and indicates that additional factors beyond taste and healthiness play a significant role in shaping individuals' willingness to buy seaweed products. Further research is needed to explore these factors and understand the underlying mechanisms behind consumers' decisions to purchase seaweed products.

5.3 Implications

The negative willingness to buy observed in each condition suggests that consumers are unwilling to pay the full price for both unprocessed seaweed and the seaweed burgers. On average, respondents indicated that they were willing to pay 0.92 cents less than the actual cost of the product. One possible explanation for this, is the low popularity of seaweed products, which may contribute to the relatively high prices of seaweed products in Dutch supermarkets. It is worth noting that both the seaweed burger and wakame seaweed used in this study represent unique offerings within their product category. However, alternative vegetarian burgers that do not contain seaweed are available at considerably lower prices. This price comparison may influence consumers' willingness to pay for seaweed products and contribute to the observed reluctance to pay the full price. In the contrary, it could be because of the desire to bargain among respondents.

Secondly, it is important to recognize that visibility and convenience do not directly impact consumers' willingness to buy seaweed products. Focusing solely on visibility and convenience may thus not be sufficient to drive consumer purchase decisions. Instead, based on this study, product developers should prioritize on perceived healthiness and expected taste to positively influence consumers' buying and consumption intentions.

It is important to note that familiarity with unprocessed seaweed acts as a barrier to consumption, which aligns with prior research. This suggests that strategies to increase familiarity, such as education and exposure, may be effective in promoting the acceptance and consumption of unprocessed seaweed products.

Moreover, the study reveals that convenience negatively affects the perceived healthiness of seaweed products. This finding provides valuable context to previous studies that have suggested prioritizing convenience in seaweed product development. It suggests that while convenience is

important for consumer acceptance, it should not come at the expense of perceived healthiness. Striking a balance between convenience and healthiness in product design and marketing messages can enhance consumer perceptions and increase the likelihood of purchasing seaweed products.

The study also highlights the difference between willingness to consume and willingness to buy as outcome variables. Factors such as perceived healthiness, Taste, and neophobia significantly influence willingness to consume, but perceived healthiness and taste have a relatively low impact on willingness to buy. This suggests that factors beyond taste and healthiness play a more significant role in shaping consumers' willingness to purchase seaweed products. Considering the habitual nature of buying practices, it is important to leverage additional motivators, such as curiosity, to increase purchase intentions. Creating curiosity-inducing situations through marketing strategies and product positioning or restaurant-setting inclusion can attract consumers' attention and drive them to try seaweed products, ultimately increasing the likelihood of subsequent purchases.

Chapter 6: References

Aldridge, V., Dovey, T. M., & Halford, J. C. (2009). The role of familiarity in dietary development. *Developmental Review*, *29*(1), 32-44.

Ali, A. E. (2016). A semiotic approach to entomophagy: the language, localization, and reimagining of insects as foodstuffs in America. *Perspectives on Global Development and Technology*, *15*(4), 391-405.

Banach, J., Hoek-van den Hil, E., & van der Fels-Klerx, H. (2020). Food safety hazards in the European seaweed chain. *Comprehensive reviews in food science and food safety*, *19*(2), 332-364.

Beck, M. E. (2007). Dinner preparation in the modern United States. *British Food Journal*.

Birch, D., Skallerud, K., & Paul, N. (2019). Who eats seaweed? An Australian perspective. *Journal of International Food & Agribusiness Marketing*, *31*(4), 329-351.

Birch, D., Skallerud, K., & Paul, N. A. (2018). Who are the future seaweed consumers in a Western society? Insights from Australia. *British Food Journal*, *121*(2), 603-615.

Birch, L. L., McPhee, L., Shoba, B., Pirok, E., & Steinberg, L. (1987). What kind of exposure reduces children's food neophobia?: Looking vs. tasting. *Appetite*, *9*(3), 171-178.

Blikra, M. J., Altintzoglou, T., Løvdal, T., Rognså, G., Skipnes, D., Skåra, T., Sivertsvik, M., & Fernández, E. N. (2021). Seaweed products for the future: Using current tools to develop a sustainable food industry. *Trends in food science & technology*, *118*, 765-776.

Branca, F., Lartey, A., Oenema, S., Aguayo, V., Stordalen, G. A., Richardson, R., Arvelo, M., & Afshin, A. (2019). Transforming the food system to fight non-communicable diseases. *Bmj*, *364*.

Brunner, T. A., Van der Horst, K., & Siegrist, M. (2010). Convenience food products. Drivers for consumption. *Appetite*, *55*(3), 498-506.

Buckley, M., Cowan, C., & McCarthy, M. (2007). The convenience food market in Great Britain: Convenience food lifestyle (CFL) segments. *Appetite*, *49*(3), 600-617.

Candel, M. J. (2001). Consumers' convenience orientation towards meal preparation: conceptualization and measurement. *Appetite*, *36*(1), 15-28.

Cavallo, C., & Materia, V. C. (2018). Insects or not insects? Dilemmas or attraction for young generations: A case in Italy. *International Journal on Food System Dynamics*, *9*(3), 226-239.

Černá, M. (2011). Seaweed proteins and amino acids as nutraceuticals. *Advances in food and nutrition research*, *64*, 297-312.

Chapman, A. S., Stévant, P., & Larssen, W. E. (2015). Food or fad? Challenges and opportunities for including seaweeds in a Nordic diet. *Botanica Marina*, *58*(6), 423-433.

Cherry, P., O'Hara, C., Magee, P. J., McSorley, E. M., & Allsopp, P. J. (2019). Risks and benefits of consuming edible seaweeds. *Nutrition Reviews*, *77*(5), 307-329.

Contini, C., Boncinelli, F., Gerini, F., Scozzafava, G., & Casini, L. (2018). Investigating the role of personal and context-related factors in convenience foods consumption. *Appetite*, *126*, 26-35.

Costa, A. I. d. A., Schoolmeester, D., Dekker, M., & Jongen, W. M. (2007). To cook or not to cook: a means-end study of motives for choice of meal solutions. *Food Quality and Preference*, *18*(1), 77-88.

De Boer, M., McCarthy, M., Mattas, K., & Tsakiridou, E. (2005). Means-end chain theory applied to Irish convenience food consumers. *Options Mediterraneennes*, *64*(2005/01), 59-73.

De Temmerman, J., Heeremans, E., Slabbinck, H., & Vermeir, I. (2021). The impact of the Nutri-Score nutrition label on perceived healthiness and purchase intentions. *Appetite*, *157*, 104995.

Dovey, T. M., Staples, P. A., Gibson, E. L., & Halford, J. C. (2008). Food neophobia and 'picky/fussy' eating in children: a review. *Appetite*, *50*(2-3), 181-193.

Elzerman, J. E., Hoek, A. C., Van Boekel, M. A., & Luning, P. A. (2011). Consumer acceptance and appropriateness of meat substitutes in a meal context. *Food Quality and Preference*, *22*(3), 233-240.

Embling, R., Neilson, L., Randall, T., Mellor, C., Lee, M. D., & Wilkinson, L. L. (2022). 'Edible seaweeds' as an alternative to animal-based proteins in the UK: Identifying product beliefs and

consumer traits as drivers of consumer acceptability for macroalgae. *Food Quality and Preference*, *100*, 104613.

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G* Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior research methods*, *39*(2), 175-191.

Field, A. (2013). *Discovering statistics using IBM SPSS statistics*. sage.

Fleurence, J., Morançais, M., Dumay, J., Decottignies, P., Turpin, V., Munier, M., Garcia-Bueno, N., & Jaouen, P. (2012). What are the prospects for using seaweed in human nutrition and for marine animals raised through aquaculture? *Trends in food science & technology*, *27*(1), 57-61.

Grunert, K. G. (2002). Current issues in the understanding of consumer food choice. *Trends in food science & technology*, *13*(8), 275-285.

Gumussoy, M., Macmillan, C., Bryant, S., Hunt, D. F., & Rogers, P. J. (2021). Desire to eat and intake of 'insect'containing food is increased by a written passage: The potential role of familiarity in the amelioration of novel food disgust. *Appetite*, *161*, 105088.

Hartmann, C., Dohle, S., & Siegrist, M. (2013). Importance of cooking skills for balanced food choices. *Appetite*, *65*, 125-131.

Hartmann, C., Shi, J., Giusto, A., & Siegrist, M. (2015). The psychology of eating insects: A cross-cultural comparison between Germany and China. *Food Quality and Preference*, *44*, 148-156.

Hartmann, C., & Siegrist, M. (2016). Becoming an insectivore: Results of an experiment. *Food Quality and Preference*, *51*, 118-122.

Hwang, J., & Lin, T.-N. (2010). Effects of food neophobia, familiarity, and nutrition information on consumer acceptance of Asian menu items. *Journal of Hospitality Marketing & Management*, *19*(2), 171-187.

Ji, M. F., & Wood, W. (2007). Purchase and consumption habits: Not necessarily what you intend. *Journal of consumer psychology*, *17*(4), 261-276.

Lazarus, J. H. (2014). Iodine status in Europe in 2014. *European thyroid journal*, *3*(1), 3-6.

Losada-Lopez, C., Dopico, D. C., & Faina-Medin, J. A. (2021). Neophobia and seaweed consumption: Effects on consumer attitude and willingness to consume seaweed. *International Journal of Gastronomy and Food Science*, *24*, 100338.

Lusk, J. L. (2019). Consumer beliefs about healthy foods and diets. *PLoS One*, *14*(10), e0223098.

MacArtain, P., Gill, C. I., Brooks, M., Campbell, R., & Rowland, I. R. (2007). Nutritional value of edible seaweeds. *Nutrition Reviews*, *65*(12), 535-543.

Mahadevan, K. (2015). Seaweeds: a sustainable food source. In *Seaweed sustainability* (pp. 347-364). Elsevier.

Mahalik, N. P., & Kim, K. (2014). Aquaculture monitoring and control systems for seaweed and fish farming. *World J. Agric. Res*, *2*(4), 176-182.

Mellor, C., Embling, R., Neilson, L., Randall, T., Wakeham, C., Lee, M. D., & Wilkinson, L. L. (2022). Consumer Knowledge and Acceptance of "Algae" as a Protein Alternative: A UK-Based Qualitative Study. *Foods*, *11*(12), 1703.

Mertens, E., van't Veer, P., Hiddink, G. J., Steijns, J. M., & Kuijsten, A. (2017). Operationalising the health aspects of sustainable diets: a review. *Public health nutrition*, *20*(4), 739-757.

Mick, D. G., Broniarczyk, S. M., & Haidt, J. (2004). Choose, choose, choose, choose, choose, choose, choose: Emerging and prospective research on the deleterious effects of living in consumer hyperchoice. *Journal of Business Ethics*, *52*(2), 207-211.

Nielsen, C. W., Holdt, S. L., Sloth, J. J., Marinho, G. S., Sæther, M., Funderud, J., & Rustad, T. (2020). Reducing the high iodine content of Saccharina latissima and improving the profile of other valuable compounds by water blanching. *Foods*, *9*(5), 569.

Onwezen, M. C., Bouwman, E. P., Reinders, M. J., & Dagevos, H. (2021). A systematic review on consumer acceptance of alternative proteins: Pulses, algae, insects, plant-based meat alternatives, and cultured meat. *Appetite*, *159*, 105058.

Palmieri, N., & Forleo, M. B. (2020). The potential of edible seaweed within the western diet. A segmentation of Italian consumers. *International Journal of Gastronomy and Food Science*, *20*, 100202.

Palmieri, N., & Forleo, M. B. (2022). An explorative study of key factors driving Italian consumers' willingness to eat edible seaweed. *Journal of International Food & Agribusiness Marketing*, *34*(4), 433-455.

Pinto, V. R. A., de Abreu Campos, R. F., Rocha, F., Emmendoerfer, M. L., Vidigal, M. C. T. R., da Rocha, S. J. S. S., Della Lucia, S. M., Cabral, L. F. M., de Carvalho, A. F., & Perrone, Í. T. (2021). Perceived healthiness of foods: A systematic review of qualitative studies. *Future Foods*, *4*, 100056.

Plasek, B., Lakner, Z., & Temesi, Á. (2020). Factors that influence the perceived healthiness of food. Nutrients, 12(6), 1881.

Pliner, P., & Hobden, K. (1992). Development of a scale to measure the trait of food neophobia in humans. *Appetite*, *19*(2), 105-120.

Raimundo, L. M. B., Batalha, M. O., & Sans, P. (2020). Consumer Attitudes Towards Convenience Food Usage: Exploring the Case of São Paulo, Brazil. *Journal of International Food & Agribusiness Marketing*, *32*(4), 403-424.

Raudenbush, B., & Frank, R. A. (1999). Assessing food neophobia: The role of stimulus familiarity. *Appetite*, *32*(2), 261-271.

Rust, N. A., Ridding, L., Ward, C., Clark, B., Kehoe, L., Dora, M., Whittingham, M. J., McGowan, P., Chaudhary, A., & Reynolds, C. J. (2020). How to transition to reduced-meat diets that benefit people and the planet. *Science of the Total Environment*, *718*, 137208.

Scholderer, J., & Grunert, K. G. (2005). Consumers, food and convenience: The long way from resource constraints to actual consumption patterns. *Journal of Economic Psychology*, *26*(1), 105-128.

Stévant, P., Indergård, E., Ólafsdóttir, A., Marfaing, H., Larssen, W. E., Fleurence, J., Roleda, M. Y., Rustad, T., Slizyte, R., & Nordtvedt, T. S. (2018). Effects of drying on the nutrient content and physico-chemical and sensory characteristics of the edible kelp Saccharina latissima. *Journal of Applied Phycology*, *30*, 2587-2599.

Tan, H. S. G., Fischer, A. R., van Trijp, H. C., & Stieger, M. (2016). Tasty but nasty? Exploring the role of sensory-liking and food appropriateness in the willingness to eat unusual novel foods like insects. *Food Quality and Preference*, *48*, 293-302.

Tan, H. S. G., van den Berg, E., & Stieger, M. (2016). The influence of product preparation, familiarity and individual traits on the consumer acceptance of insects as food. *Food Quality and Preference*, *52*, 222-231.

Tilman, D., Balzer, C., Hill, J., & Befort, B. L. (2011). Global food demand and the sustainable intensification of agriculture. *Proceedings of the national academy of sciences*, *108*(50), 20260-20264.

Tversky, A., & Kahneman, D. (1974). Judgment under Uncertainty: Heuristics and Biases: Biases in judgments reveal some heuristics of thinking under uncertainty. *science*, *185*(4157), 1124-1131.

Vermeulen, S. J., Campbell, B. M., & Ingram, J. S. (2012). Climate change and food systems. *Annual review of environment and resources*, *37*(1), 195-222.

Wolfson, J. A., Bleich, S. N., Smith, K. C., & Frattaroli, S. (2016). What does cooking mean to you?: Perceptions of cooking and factors related to cooking behavior. *Appetite*, *97*, 146-154.

Zajonc, R. B. (1968). Attitudinal effects of mere exposure. *Journal of personality and social psychology*, *9*(2p2), 1.

Ziino, G., Nibali, V., & Panebianco, A. (2010). Bacteriological investigation on "Mauro" sold in Catania. *Veterinary research communications*, *34*, 157-161.