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Double Degree
Master of Science in Strategic Marketing Management
and Marketing Analytics & Metrics

Food Waste & Food Imperfection

University:
Luiss Guido Carli university

Submission date:
June 10

Submission deadline:
June 14

Place:
Rome, Italy

Supervisor:
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Abstract

Food waste constitutes a serious issue in the world today, and it involves consequences beyond the financial losses. It includes the waste of limited natural resources, along with unnecessary produce of greenhouse gas emission contributing to global warming and climate change. Moreover, simultaneously as enormous amounts of food are being wasted around the world, millions of people are suffering from hunger and malnutrition. An identified source considerably contributing to the amounts of food wasted today involves consumers' and retailers' rejection of visually imperfect products.

This master thesis is therefore addressing the food waste issue based on imperfect products, and seeks to better understand consumers' rejecting behavior. The purpose of the study is to gain deeper knowledge of consumers' quality perceptions and their emotional reactions based on exposure to imperfect fruit and vegetables, to see how this affects their purchase intention. These insights were gained from an experimental survey conducted on 337 European consumers. The survey participants were randomly exposed to one out of eight conditions, in which the real apple-images were used to illustrate varying degrees of imperfections. The data analyzation revealed that a perfect compared to an imperfect product influences consumers' willingness to purchase, through elicited emotional reactions, which further shape consumer attitudes. The findings indicate that the imperfections perceived to be the most abnormal are rotten and crushed imperfections. These imperfections scored highest on risk perception and evoked the most negative emotional responses among consumers, particularly disgust, contempt, and uncertainty. The results indicate that consumers exposed to an imperfect apple report a lower willingness to purchase than consumers exposed to a perfect apple. This is based on stronger evoked feelings of disgust, leading to more negative attitudes towards the apple imperfection.

The research findings constitute contributing information relevant for developing intervention strategies aimed at reducing consumer food waste based on imperfect products. It further provides retailers with useful information regarding consumers' emotional responses based on various imperfections. It can thereby help them in how to display, sell, price, and market these products to encourage consumers' willingness to purchase. Finally, as previous research studies primarily have focused on shape-abnormalities, the current results emphasize the importance of focusing marketing initiatives on other abnormalities, like crushed and rotten imperfections.

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1.0 Introduction to the research topic

1.1 Food waste and food imperfection

Every year, the wasted amounts of food compose a critical issue related to both global food security and good environmental governance (Stenmarck, Jensen, Quested, & Moates, 2016). According to the U.S. Department of Agriculture, food loss and waste make up nearly 40% of the food supply in the United States, with the retail sector being responsible for around 10% and consumers responsible for as much as 20% (USDA, 2018). The latter amounts to approximately 90 billion pounds a year (USDA, 2018). This is coherent with previous research studies stating that consumers are the single biggest contributor to the total volume of generated food waste (Griffin, Sobal, & Lyson, 2009). Additionally, households have been found to be a major contributor to food waste in developing countries (Parfitt, Barthel, & Macnaughton, 2010; Pearson, Minehan, & Wakefield-Rann, 2013), and UK based statistics show that the average household discards about 25% of all purchased food (Watson & Meah, 2012). Globally, close to one third of all food produced for human consumption is being wasted each year, amounting to 1.3 billion tons in yearly waste (Gustavsson, Cederberg, Sonesson, van Otterdijk, & Meybeck, 2011). Food waste have therefore received an increased attention over the last few years, with its consequences currently being evaluated and attempted reduced through academic debates, civil society initiatives, and political agendas (Falasconi, Vittuari, Politano & Segrè, 2015).

Food waste is separated from food loss, as the latter defines lost or damaged food that is no longer suitable for human consumption, and is therefore thrown away before it reaches the end consumer (Lagorio, Golini & Pinto, 2018). On the contrary, food waste can be referred to as food that is originally produced for human consumption, but gets discarded as opposed to consumed (Thyberg & Tonjes, 2016). Unlike food loss, it includes food that was still edible when thrown away. This research paper focuses solely on food waste, as this is generated in higher quantities than food loss (Thyberg & Tonjes, 2016), amounting to more severe financial consequences.

Beyond the extensive financial losses, the amounts of food waste are remarkably depleting the environment of limited natural resources. A comprehensive squandering of resources occurs every year, including the waste of water, land, energy, labour and capital, as well as unnecessary

produce of greenhouse gas emissions, contributing to global warming and climate change (FAO, 2013). Significant energy losses thereby follow from discarded food, including energy used to produce, distribute, and process the wasted food, as well as the energy captured in the food itself (Griffin et al., 2009). Another aspect of the food waste issue involves the immoral action of throwing away edible food when there exists an unfair imbalance of food access across the globe (Aschemann-Witzel, De Hooge, Rohm, Normann, Bossle, Grønhøj, & Oostindjer, 2017). Along with huge amounts of food being wasted in many parts of the world, concurrently a frightening number of 795 million people are suffering from severe hunger and malnutrition (Lyons, 2015). The consequences of the wasteful behavior existent today therefore amplify a drastic need for change.

Reduced global food waste would contribute to achieving sustainable development goals, such as supporting the fight against climate change, saved money for farmers, companies, and households, and most importantly, saved nutrition food for redistribution to those in need. The latter would be an essential aid in eradicating hunger and malnutrition, and it would have a crucial impact on meeting the demand of global food needs. Moreover, reduced food waste at the household level would contribute to an increase in global security and a reduction of greenhouse gas emissions (Pearson et al., 2013). Efficient initiatives to prevent food waste will therefore have substantial impact on the global well-being. As food waste is a function of several factors, such as cultural, personal, political, geographic, and economic forces (Pearson et al., 2013), an effective prevention strategy requires an identification of the elements that together result in the wasted amounts of food.

An identified and imperative source significantly contributing to consumer food waste is retailers' and consumers' unwillingness to sell and buy "imperfect" products (Aschemann-Witzel, de Hooge, Amani, Bech-Larsen & Oostindjer, 2015; De Hooge, Oostindjer, Aschemann-Witzel, Normann, Loose & Almli, 2017). The waste of imperfect products, also called suboptimal products, comprise food that contribute to the largest amount of food waste today (Aschemann-Witzel et al., 2015). It can be defined as edible products that are perceived as undesirable in comparison with similar products, and are therefore being wasted at the consumer level. This can be based on either of two reasons; the products are close to (or at) the best-before date, or they deviate visually or in other sensory perceptions from the perceived optimal products (Aschemann-Witzel et al., 2015). Regarding the latter, a continuously growing food waste issue concerns the fact that large quantities of food are being wasted at the retail

level, due to quality standards that over-emphasize product appearance (FAO, 2013). The exclusion of displaying fresh food that do not conform to specific standards for visual appearance is today a common practice in the retail food industry (Loebnitz & Grunert, 2015). This research paper will therefore investigate food waste related to product imperfections based on appereance.

Many research studies have identified the cosmetic specifications for various products as an important contributor to food waste at the multiple levels in the supply chains, especially for fruits and vegetables (Hebrok & Boks, 2017; de Hooge, Ilona, van Dulm, & van Trijp, 2018). The Food and Agriculture organization of the U.K also reports that fruit and vegetables are among the products that have the highest wastage rates of any food (FAO, 2013). Over the years, supermarkets have embraced such high cosmetic standards for fruit and vegetables that it is causing them to dismiss even marginal flaws or deformities in food (Kor, Prabhu & Esposito, 2017). Consequently, around one third of vegetables are reported left in the field, meaning it does not reach the retailers because it fails to meet the current marketing standards, and/or because of insufficient market demand (Blanke, 2015). Because of the strict quality standards related to weight, shape and appearance of products, retailers are currently being heavily criticised for their contribution to food wastage (Stuart 2009; Aschemann-Witzel, 2018). This is based on retailers' aesthetic product specifications, their removal of suboptimal items from display, and marketing of "perfect" products, which influence consumers' perception of perfect versus imperfect food (Aschemann-Witzel, 2018).

1.2 Why is this topic relevant?

A reduction of food waste related to perfectly edible food will require both supermarkets and the consumers to start embracing the "ugliness" of the currently defined imperfect products, as opposed to rejecting it. Many initiatives have recently been taken to embrace shape abnormalities in fruit and vegetables. Among others, various campaigns have been launched to increase consumers' purchase intentions towards these suboptimal products by changing their negative perceptions of the product appearances. The boxes below illustrate examples of initiatives implemented around the world, by innovative start-ups, well-known supermarkets, grocery chains, and retailers.

Supermarkets, grocery chains, and retailers:

- In 2014 French supermarkets started selling misshaped and lumpy fruits and vegetables at a 30% discount as a way of trying to limit the food waste, as well as alter peoples' perceptions of ugly food as bad quality food (Cliff, 2014).

- In 2016, France became the first country in the world to prohibit supermarkets from throwing away unused food through unanimous passed legislation (Hinckley, 2018).

- "The inglorious fruits and vegetables" is a campaign launched by the French retailer Intermarché, with the aim of increasing peoples' awareness of the problem of food waste, and inform them of how they need to act to contribute to a decreased waste (Cliff, 2014).

(Picture from Inglorious fruits and vegetables campaign)

- Following this trend, grocery chains like Asda and Morrisons are also trying to curb the food waste by experimenting with selling what they call "wonky" vegetables at a discounted price (Kor et al., 2017).

(Picture of Asda and Morrisons' 'wonky' vegetables boxes)

- Kroger, M&S, and Sainsbury are examples of other initiatives taken as efforts to reduce food waste in their process of building nationwide systems to distribute surplus edible food to charities instead of throwing it out (Kor et al., 2017).

Fig.1 Summarizing descriptions of initiatives implemented by retailers and grocery chains around the world to reduce food waste based on imperfectly shaped products

Start-ups and small businesses:

- "Imperfect Picks" is a campaign started by a Spanish biotechnology student named Carla Espinós Estévez, which aims at educating and encouraging children to embrace 'imperfect' fruit and vegetables (Youth Ag Summit, 2017). Carla and two of her classmates are currently working towards implementing their idea globally.

(Pictures from Imperfect Picks campaign)

- Many small businesses have also started with initiatives to reduce the waste of imperfect food by embracing and finding alternative ways of using and selling weird shaped and sized food. These include Eat Me Chutneys in Sydney, Ugly Duck Preserves in Brisbane and Green banana flour in Queensland (Helbig, 2018).

Fig.2: Additional summarizing descriptions of food waste reduction campaigns implemented by small businesses to reduce waste based on imperfect products.

Despite these positive contributions and initiatives taken towards a reduced food waste based on imperfect products, still as much as 45% of all food being wasted involves fruits and vegetables (Lyons, 2015). In the U.S., more than 15.4 billion of edible fruits and vegetables are being thrown out by retailers each year (Buzby, Farah-Wells & Hyman, 2014). Furthermore, in Australia 40% of edible fruit and vegetables are rejected even before it reaches the shops, simply because of aesthetic reasons (Helbig, 2018). Also in Europe, over 50 million tonnes of edible fruit and vegetables are being wasted based on aesthetic imperfections (Quinn, 2018). Thus, products that do not meet the standards of appearance rarely get through the entire supply chain to the end-consumer (de Hooge et al., 2018). These beauty standards are thereby contributing to food waste by both supply chain actors and consumers discarding food that does not look perfect enough. This means that there is still a long way to go to stop imperfection based food waste.

Before continuing with initiatives like the ones mentioned above, there is a need for deeper insight in the fundamental elements of consumers' current decision making and behavior. This is crucial knowledge needed to effectively induce a long-term behavioral change strategy, with

a focus on removing the current appearance standards for fruits and vegetables. Additionally, it is imperative with an identification of all relevant stakeholders, to successfully come up with an appropriate intervention strategy that will be implemented and completed by all parties involved. Relevant stakeholders in relation to food waste based on food imperfection involves; consumers, supermarkets, employees, retailers, distributers, suppliers, nonprofit organizations, the government, producers, producer organizations, and farmers. In conjunction with this, de Hooge et al. (2018) state that cosmetic product specifications for fruits and vegetables are self-imposed by the food supply chain, at three supply chain levels; producers, producer organizations, and retailers. Producers and producer organizations usually set cosmetic specifications themselves, to make sure that they are perceived as a high-quality player with high quality products (de Hooge et al., 2018). This is all contributing to maintaining the current beauty standards that are considerably affecting the food waste based on food imperfection.

Consequently, even though supply chain actors might be motivated to display imperfect food in their shelves, supermarkets still refrain from doing so as they assume consumers will not be willing to buy these products (de Hooge et al., 2018). Their assumptions are confirmed by research studies whose findings imply that consumers express higher purchase intentions for normally shaped compared to abnormally shaped food, with decreasing intentions based on the severity of the shape-abnormality (Loebnitz & Grunert, 2015). Thus, according to de Hooge et al. (2018), simply moral or sustainability considerations are not sufficient for the market positioning of suboptimal products as a long-term success strategy. The suboptimal products must first fulfil the supply chain actors' economic motivation to maximize value for such products to become a success in the market. Seeing that supply chains are essentially focused on delivering products valued by their customers (Kozlenkova, Hult, Lund, Mena & Kekec, 2015; de Hooge 2018), the ultimate factor inherently affecting food waste (e.g. through what retailers decide to put in their shelves) is consumers' preferences and purchasing behavior. This is reinforced by Grewal, Hmurovic, Lamberton and Reczek (2019), stating the importance of understanding consumers' responses to the unattractive products in the stores, to come up with effective, sustainable strategies for interventions that will change consumers' behavior. Furthermore, as retailers are the most visible supply chain actor in the eyes of the end-consumer, their activities and marketing communications have a huge impact on consumers' knowledge and attitude towards the topic of food waste, and their perception of food products (Lombart & Luis, 2014). Thus, the most feasible strategy for food waste reduction lies within the generators of food waste, involving the retail and consumer sectors, as opposed to the production and

processing sectors (Parfitt et al., 2010). Therefore, both consumers and retailers are the two most important stakeholders in relation to food waste and food imperfection. Consumers in particular will constitute the focus of this paper, as they are the ones determining, based on their perceptions, whether a product is of high or low quality. This ultimately affects what retailers put in their shelves.

2.0 Literature review

The studies on food waste in relation to food imperfection have focused on various aspects of the issue. The aims have mostly been to understand the reasoning behind consumers' purchasing behavior and perceptions of suboptimal products, to build possible intervention strategies that will facilitate a reduced food waste. In the process of collecting the research material, the search engines used were mainly Google Scholar and Business Source Complete. Search terms used for attaining the data involved the following: "food waste" AND "food imperfection", "food waste consequences", "product appearance" AND "food waste", "imperfect fruit and vegetables", "food waste consumer behavior". Based on this, several articles regarding food waste and food imperfection were selected depending on their relevance for the current research study. Appendix 1 comprise of a chronological review of the selected research material, including the research questions, gaps in the literature, possible hypotheses, findings, and suggestions for future research studies. The appendix includes only the research papers focusing on different aspects of food imperfection as antecedents of food wastage.

The following literature review constitutes a complementary description of the research studies on food waste related to food imperfection, along with barriers found to be preventing consumers from changing their food waste behavior. The subsequent sections are constructed based on the main factors found to affect consumers in their rejection of imperfect fruit and vegetables; 1) quality associations based on product appearance, 2) emotional reactions of disgust, 3) consumer habits, meal planning, and shopping routines, 4) subjective norms and perceived behavioral control, 5) self-identity, and 6) awareness of environmental consequences.

2.1 Quality associations based on product appearance

The most profound and directly related issue to food waste based on imperfect products, is consumers' association of the product's visual appearance with its' quality standards. When evaluating fresh food, the outward appearance of a product represents the main quality cue for

consumers, which differentiate fresh food products from other retail products (Grunert, Bredahl & Brunsø, 2004). As consumers associate food imperfections with lower product quality, it makes them less willing to purchase these types of products (de Hooge et al., 2017; Loebnitz & Grunert, 2015). Thus, at the point of purchase, consumers usually rely on appearance as an extrinsic cue to assess in their estimation of the intrinsic quality of the product (Aschemann-Witzel et al., 2015). Consumers therefore end up choosing the seemingly more attractive product, as they believe the appearance represents its quality and taste. Previous research has also found that consumer purchase intention depends on the perceived degree of shape abnormality or imperfection of the products (Loebnitz, Schuitema & Grunert, 2015). Moreover, for both internally and externally defected apples, research results show that the amount of people rejecting to purchase and/or consume depends on the severity of the bruised apple (Jaeger, Antunez, Ares, Johnston, Hall, & Harker, 2016; Jaeger, Machín, Aschemann-Witzel, Antúnez, Harker, & Ares, 2018). Even very small variations in shape or defected marks on apples is proved to lead to a decrease in consumers' quality perception of the apple (Jaeger, Antúnez, Ares, Swaney-Stueve, Jin, & Harker, 2018).

As people regard food quality, including taste, as a sufficient consideration in deciding to purchase or consume fruit and vegetables, this constitutes a coherent barrier to a reduced food waste by diminishing peoples' feelings of guilt when throwing out food, along with a lack motivation to reduce food waste (Graham-Rowe, Jessop, & Sparks, 2014). However, as already established, the quality standards consumers are using are presumably biased by the visual appearance of fruits and vegetables, which are set to meet unrealistic and distorted beauty standards. Thereby, since individuals' perception of their own wasting behavior is a crucial factor influencing food waste (Aschemann-Witzel et al., 2015), an alteration of peoples' perceptions is essential to remove their interpretation of visual imperfections as a sign of bad quality.

In conjunction with consumers' quality perceptions, the appearance of fruit and vegetables have also been found to affect people's risk perception. Consumers' perceived risk is higher for an abnormally shaped vegetable compared to a normally shaped vegetable (Loebnitz & Grunert, 2018). This is based on an underlying mechanism in which people associate vegetable shape-abnormalities with genetically modified food, leading to higher risk perceptions (Loebnitz & Grunert, 2018). Thus, consumers have a perceived naturalness when it comes to fruits and vegetables that negatively influences their risk perception of abnormally shaped vegetables

(Loebnitz & Grunert, 2018). Previous research has also found that consumers' quality associations are negatively affected by a product's color deviations, in which they perceive this as unattractive, bad-tasting and/or unsafe to eat (de Hooge et al., 2017). Assumptions can be drawn from these findings in which consumers' health concerns seem inclined to increase with the severity of the defected fruit or vegetable. This could be based on evoked feelings of disgust, which is described as a response to a range of stimuli perceived as unclean, contaminated, and potentially provoking of diseases (Rozin, Haidt & McCauley, 2000; Olatunji, Williams, Tolin, Abramowitz, Sawchuk, Lohr & Elwood, 2007). This can both be based on state or trait disgust, in which the former involves aversion based on exposure to disgust-relevant stimuli (Olatunji et al., 2007). The latter concerns people differing in their risk perception based on their individual disgust sensitivity (Olatunji et al., 2007).

2.2 Emotional reactions of disgust

A barrier in altering consumers' rejecting behavior are therefore the emotional reactions elicited when exposed to imperfect fruits and vegetables. These emotions are based on the association between imperfection and low quality, along with disease evoking features. Regarding the latter, this could be the perception that eating ugly, bruised, or cut fruits and vegetables can make you sick. This would be an indication that emotions elicited when exposed to imperfect products are likely to be disgust, and maybe fear and safety concerns, seeing that these reactions are related to disease avoidance, which is the most prominent for disgust (Oaten, Stevenson, & Case, 2009). Additionally, according to Rozin et al. (2000), disgust is usually experienced as a feeling of revulsion, sometimes even followed by getting nauseous, along with a desire to avoid the disgust eliciting 'source'. This could explain the fact that consumers frequently reject products that are perceived to be imperfect based on appearance. This is a result of how retailers have used perfect physical appearance of fruits and vegetable to attract consumers, leading them to ultimately use visual food aesthetics as critical cues in evaluating that a product is safe to consume (Block, Keller, Vallen, Williamson, Birau, Grinstein & Moscato, 2016). Thus, according to White, Lin, Dahl, & Ritchie (2016), consumers' desire for perfect-looking fruit and vegetables might even come from peoples' evolutionary instincts to protect themselves from objects that could pose a threat to health or safety. The minimal, or lack, of displaying imperfect products in the shelves today have made consumers unaccustomed to seeing imperfections in food products. They therefore associate it with being abnormal, substandard, and unsafe. Thus, as food safety is indicated as a top reason for why consumers waste food (Neff, Kanter, & Vandevijvere, 2015), it is important to remove potential biased emotions

evoked by imperfections in fruits and vegetables, currently leading consumer to avoid products that are perfectly safe to eat.

According to Block et al. (2016), contagion is a powerful denominator in the food domain, inducing people to show strong aversions towards food that are deemed disgusting. Consumers also tend to rely more on emotions like disgust than cognitive assessment when evaluating either an expired food, or when food becomes "contaminated" in the consumers' mind (Block et al., 2016). The latter could involve exposure to imperfect fruit or vegetables. In addition to fresh products, even imperfections in the form of a ripped label on a can, can act as contamination cues that are provoking health and safety concerns (White et al., 2016). Therefore, the emotional reaction of disgust depicts a relevant barrier in changing consumer behavior in terms of purchasing imperfect products. Enhancing this assumption, is the fact that a central feature of cues that evoke disgust involves the perception of a neutral object becoming disgusting through contact. This is somewhat related to Grewal et al.'s (2019) findings, in which unattractive products alter consumers' self-perception, in so that purchasing or consuming such products lead to a self-diagnostic signal negatively influencing the way they view themselves. Moreover, whereas Grewal et al. (2019) mainly based their study on misshaped products, other types of imperfections might lead to even stronger feelings of disgust, depending on the perceived severity of the imperfection.

Finally, Oaten et al. (2009) state that as for most biological traits, there should be a varying degree of the presence of the disgust trait for each individual. Thus, some individuals might be more disgust sensitive than others. For example, women have been proved to be more disgust-sensitive than men, at least for some identified disgust domains, particularly sexual disgust (Tybur, Lieberman, & Griskevicius, 2009; Oaten et al., 2009). Furthermore, according to Oaten et al. (2009), difference in disgust sensitivity have predictable consequences, in which people with low disgust sensitivity may, among others, make less careful food choices, and have a greater number of sexual partners than people with higher disgust sensitivity. This is assumed to be transferred to emotional reactions elicited when exposed to imperfect products, and lead to different intentions and behavior in terms of purchasing or consuming these products.

2.3 Consumer habits, meal planning, and shopping routines

Consumer habits constitute an additional barrier identified in terms of changing consumer behaviors, and it has been found to be one of the most important predictors of food waste

(Russell, Young, Unsworth & Robinson, 2017). At the purchase stage, people usually rely on their previous shopping routines (Maubach, Hoek, & McCreanor, 2009), and they make purchase decisions based primarily on their habits (Farr-Wharton, Foth & Choi, 2014; Russell et al., 2017). This implies that altering peoples' behavior in terms of purchasing imperfect fruit and vegetables, requires an altogether change in their behavioral routines, along with a separation from their old habits (Stern, 2000). Hebrok and Boks (2017) also implies that it is imperative to figure out how to change current consumer food practices to reduce household food waste.

Additionally, it has been found that lack of planning for domestic food preparations is the main factor contributing to household food waste (Romani, Grappi, Bagozzi, & Barone, 2018). Based on this, consumers' planning, routines, and shopping behaviors are described as important elements to consider when studying food waste, seeing that these elements affect the amount of food wasted (Stefan, van Herpen, Tudoran & Lähteenmäki, 2013; Romani et al., 2018). A reduction of food waste could thereby involve inducing people to start planning what and how much to purchase when they go to the store. Particularly, along with a removal of product appearances as quality signs, this could make people include imperfect products in their shopping. In addition to shopping and purchasing behaviors, both food cooking and consumption practices constitute supplementary reasons for domestic food waste (Farr-Wharton et al., 2014). Thus, not only are people unaware of their food stock when they go shopping, leading them to purchase items they already own, but many consumers are also uncertain of whether food is edible or not (Farr-Wharton et al., 2014). The latter can be explained by some of the abovementioned aspects, involving consumers using visual appearances to determine edibility and quality, along with misinterpreted date labelling.

Finally, previous research has separated consumers' waste behavior in the purchase situation in-store, from a consume versus not consume situation at home. This split has identified that preferences for suboptimal products compared to optimal ones, based on either appearances, date-labelling or packaging, is affected by whether the consumers are at the supermarkets or at home (de Hooge et al., 2017). The results show that respondents in a supermarket condition choose suboptimal products less often, compared to respondents in a home condition (de Hooge et al., 2017). Additionally, according to Jaeger and Machín et al. (2018), consumers' willingness to purchase externally defected apples are lower than their willingness to consume the same apples. This can be explained by the fact that household economics is a rather

significant part of the reason why people are against food waste (Watson & Meah, 2012). Thus, when consumers are faced with a consume versus not-consume situation, they have probably already purchased the product, and are facing the economical aspect of throwing away food. By not eating it, despite its defect, it will be a waste of money. This research study will focus on the in-store purchase situation, since this constitutes an even higher rate of wasted food based on both consumers and retailers rejecting the suboptimal products. However, a comparison between respondents' willingness to consume and their willingness to purchase will be included in the study, to see whether previous findings will be confirmed.

2.4 Subjective norms and perceived behavioral control

Two additional factors described to be affecting consumer waste behavior are the subjective norms and consumers' perceived behavioral control (Stefan et al., 2013). Subjective norms can be connected to people reporting "doing the right thing" as an important motivational factor for not wasting food (Graham-Rowe et al., 2014). Perceived behavioral control involves whether consumers believe they are able to act in a way that does not amount to a lot of wasted food, for example by appropriately planning the amount of food to buy and prepare for their household (Evans, 2012). Coherently, another barrier minimising household food waste is found to be peoples' perception of the food waste responsibility as being of the food industry and supermarkets, rather than the individual (Graham-Rowe et al., 2014). This involves people disclaiming responsibility for their own actions, as well as their perception of control in the matter. It displays the importance of educating consumers of the problem of food waste based on food imperfection, and how they easily can contribute to reduce the waste.

2.5 Self-identity

Consumers' self-identity is proved to be yet another important factor influencing their purchasing behavior. According to the identity theory, people act in a certain way to match their self-image and express their identity (Stryker & Burke, 2000). In accordance with this theory, it has been found that people tend to coordinate their self-identity with their behavior to avoid an internal dissonance (Loebnitz et al., 2015). Furthermore, peoples' desire to appear as good providers has also been found as a barrier to reduced food waste (Graham-Rowe et al., 2014). This involves the tendency to over-purchase, to throw away food rather than risk their health, and the purchasing of large amounts of healthy food to express a healthy provider identity (Graham-Rowe et al., 2014). This could potentially explain why people purchase perfectly looking fruits and vegetables, to go along with their desired provider identity. This is elucidated

by the fact that an important driver of consumer behavior involves establishing an identity, as consumers purchase products to express who they are and who they would like to be (Dittmar, 2004). Moreover, Grewal et al. (2019) state that consumers devalue unattractive produce because of altered self-perceptions. This is because purchasing or consuming unattractive products serve as a self-diagnostic signal that negatively influence how consumers view themselves. Simply imagining eating unattractive food negatively affects the way consumers see themselves, and therefore decrease their willingness to purchase, compared to equally safe but more attractive alternatives (Grewal et al., 2019). As stated above, this might be connected to peoples' feelings of disgust when exposed to such imperfect products.

Furthermore, as social media constitutes a major part of our daily life and are channels people use to express their identity, one could consider this an important influential factor in terms of self-identity and the rejection of imperfect products. This can also be found through todays' trends, in which young people use their Instagram and Snapchat to share their aesthetically, beautiful, and perfect meals, including fruits, berries and salads. Taking pictures of ones' food before eating it (especially if it looks aesthetically pretty) has become so normal that people use phrases like "the camera eats first". Hence, this is contributing to people selecting out only the perfect products in the shelves, seeing that a large part of our social media use is driven by our desire to express our personal identity (Aalen, 2015). Both Instagram and Snapchat are today channels where people express their own identity, as well as they are being influenced by their perception of other people based on what they communicate through their posts (Staude & Marthinsen, 2013). These networking platforms are also giving us feedback through "likes", comments, and shares, which might amplify peoples' need to post the most perfect pictures with the most perfect-looking food.

A way to diminish this perception of perfect versus imperfect food could be, particularly for retailers and restaurants, to start exposing more consumers to imperfect products to reduce the perceived abnormality. Repeat exposure to such products would be an aid in normalizing their visual looks, and thereby eventually remove the difference in attractiveness between 'normal' and 'abnormal' fruit and vegetables. This is based on the mere exposure effect, involving people's tendency to prefer products that appear familiar to them (Zajonc, 1968). Familiarity is also found to significantly influence likelihood of choice (Aschemann-Witzel, 2018). Thereby, to change consumers' behavior, food retailers must make imperfect food available to consumers, who in turn must be motivated to change their behavior (Stern, 2000). Thus,

although changing habits is a long-term process, food retailers can, and do, play a crucial role in the education of consumers to stop food waste (Kor et al., 2017).

2.6 Awareness of environmental consequences

Finally, frequently mentioned as a possible influence on consumers' rejection of imperfect food is their environmental knowledge and concern. Some studies have found that consumers with higher environmental concerns do have a higher tolerance for imperfections in fruits and vegetables, and report higher purchase intentions towards abnormal products (Aschemann-Witzel et al., 2015; Loebnitz & Grunert, 2015; de Hooge et al., 2017). In contrast, Hebrok and Boks (2017) found that the way people perceive their environmental efforts is not necessarily reflected in the environmental impact of their practices. Additionally, Loebnitz et al. (2015) did not find any relations between people with strong proevnironmental self-identity and an increased purchase intention for imperfect food. However, they found that people with higher problem awareness of food waste did express higher purchase intentions towards abnormally shaped food (Loebnitz et al., 2015). Therefore, an increased awareness of food waste issues among consumers, especially those with already strong proenvironmental self-identities, could encourage more consumers to purchase abnormally shaped fruits and vegetables (Loebnitz et al., 2015). This implies that people need to become aware of the severity of the consequences of food waste, as well as knowing that purchasing imperfect food is a way to reduce food waste.

2.7 Contribution and research question

Despite the abovementioned aspects diminishing consumers' motivation to reduce food waste and purchase imperfect products, it is still found that consumers most often feel troubled or guilty when engaging in wasteful behaviors (Evans, 2012). Moreover, people are generally found to be negative towards food waste and express waste concerns (Watson & Meah, 2012; Graham-Rowe et al., 2014). This implies that the right intervention strategy based on consumers' emotional reactions can succeed in motivating people to take waste-reducing actions. However, according to Hooge et al. (2018), there is a lack of research on consumers' decision-making process on motivations, abilities and opportunities concerning suboptimal products. Additionally, it is necessary with an extensive understanding of the factors constructing consumers' perceptions and behaviors in relation to food waste, to reduce the consumer-related waste (Aschemann-Witzel et al., 2015).

Until now, intervention strategies suggested by experts have been for retailers to incentivize the purchase of suboptimal food by lowering prices, or by selling it in separate classes (Aschemann-Witzel et al., 2015). However, previous research on imperfect fruit and vegetables have mostly focused on imperfection in terms of abnormal shapes (Loebnitz et al., 2015; Anschemann-Witzel et al., 2015; de Hooge et al., 2017; Grewal et al. 2019), in which a price reduction might be enough to increase purchase intention. Only a few studies have looked at the many other types of abnormalities, such as color, bruises, and lumps, which could lead to alternative results and thereof require other types of interventions to influence consumers' willingness to purchase. Among these, de Hooge et al.'s (2017) findings show that consumers' preferences rely on different products, and that different deviations in the product's abnormal appearance plays a role. In support of these findings, Loebnitz and Grunert (2015) found that consumers have higher purchase intentions for moderate abnormal shaped lemons and eggplant compared to the same degree of abnormality in carrots and apples. Moreover, Jaeger and Machín et al. (2018) found that consumers' evaluation of quality, and their consumption and purchasing decisions, were based on the severity of bruises, cuts and splits in apples. Thus, we already know that consumers' perception of quality and willingness to purchase depends on visual defects, but we do not know which imperfections are the most severe. Several researchers have therefore suggested future research to focus on different imperfections, besides shape, to see how they vary in their influence on consumers' buying behaviors (Loebnitz & Grunert, 2015; de Hooge et al., 2017; Loebnitz & Grunert, 2018).

In addition to investigating which imperfection criteria are the most distinct and least desirable, it has also been suggested to look at consumers' emotional reactions towards the different imperfections (Loebnitz et al., 2015, de Hooge et al., 2017; Jaeger & Machín et al., 2018, de Hooge et al., 2018; Grewal et al., 2019). Moreover, future researchers have been suggested to focus on changing peoples' associations of imperfect food as having low quality, by looking at their decision-making process, and their motivational abilities and opportunities concerning imperfect food (Jaeger & Machín et al., 2018; de Hooge et al., 2018). The focus of this paper will therefore be fruits and vegetables, seeing that these products have very high appearance standards, and consumers usually associate the appearances of these products with its' quality.

An imperative contribution to the research area of imperfect products would thus involve an identification of the emotional reactions elicited by various imperfections in fruits and vegetables, and identify which are the least desirable, and why this is (de Hooge et al., 2017).

Each individual consumer's disgust sensitivity might also be of importance in their evaluation and decision making process when purchasing imperfect products. This would contribute to an understanding of consumers' rejecting behavior of these products. It might also be an aid in coming up with ways to effectively alter consumers' decision-making process, intended to induce more waste preventive behaviors. Based on this, a research question was developed and formulated as follows:

What emotional reactions are elicited by the different kinds of imperfections in fruit and vegetables, and how are they affecting consumers' rejecting behavior in the purchase situation? What are the most distinct and least desirable abnormalities?

The research study seeks to address the gap in knowledge regarding the reasoning behind consumers' decision making in relation to the different types of imperfect fruits and vegetables. An aim would be to find whether different individual traits and levels of disgust will influence the results. Preferably, the final research outcome will provide supply chain actors, particularly retailers, with useful insight. The results could be valuable for retailers in evaluating the factors influencing consumer choices, and educating them in terms of how to display, price, and sell various imperfect products in a way that makes customers inclined to purchase them.

2.7.1 Hypothesis development

From the research question above, three subsequent hypotheses were developed and will be tested through the methodological study. The first hypothesis is based on the desire to find whether different imperfections influence consumers and their purchase intention in various ways. The assumption is that more severe imperfections will decrease their willingness to purchase. The second hypothesis involves a further understanding of why and how some imperfections are leading to a lower purchase intentions that others. Based on the above-mentioned research on emotional reactions of disgust, one could assume that more severely perceived imperfections will lead to stronger negative disgust emotions, which then affects consumer attitudes and eventually purchase intention and behavior. Finally, as mentioned, an interesting aspect to consider is whether individuals' disgust sensitivity will impact the level of disgust emotions evoked by exposure to imperfect products. Here, the assumption implies that a consumer with a higher disgust sensitivity will evoke stronger feelings of disgust when exposed to an imperfect product, compared to a consumer that is less disgust sensitive.

Hypothesis 1:

Varying degrees of imperfections in products will evoke varying degrees of emotional reactions, with more severe imperfections leading to stronger negative emotions and decreased willingness to purchase.

Hypothesis 2:

An imperfect, compared to a perfect, product will lead to a lower willingness to purchase through evoked emotions of disgust, leading to negative attitudes towards the product.

Hypothesis 3:

Higher individual disgust sensitivity will lead to stronger evoked feelings of disgust, and thereby more negative attitudes, leading to a decreased willingness to purchase imperfect products.

3.0 Methodology

The following sections involve a description of; the research design, the data collection, the method procedure, survey measures, and data analyzes. The final sections include two conceptual models implemented to analyze the research question and subsequent hypotheses, along with an explanation for the chosen variables included in the model.

3.1 Research design

Based on the aim of the study, an appropriate data collection technique involved a descriptive design implemented in the form of a quantitative analysis. This included a web-based experimental survey that was conducted and distributed through the online questionnaire service Qualtrics. The background for the use of Qualtrics is that it constitutes a service that allows for several measures and a variety of settings, including image exposure, and the use of randomized, different conditions that consumers can be exposed to. These were features needed to conduct the experimental survey developed to answer the research question. Furthermore, this type of online survey tool increases the internal validity of the survey, as respondents are not able to go back and change their answers after a response is given.

3.1.1. Data collection

The participants were collected through a mix of convenience and snowball-sampling. The survey was first distributed to eligible participants through Facebook, along with them being

encouraged to further distribute the survey to friends and acquaintances. It was also distributed through a Facebook group, consisting of a broad specter of members interested in preserving edible food. The group was called "Just Eat It – A Food Waste Story", and consisted of 16,773 followers. It is important to acknowledge that these types of data collection methods might lead to a biased sample, not representative of the population (Foldnes & Pehrson 2015). Thus, to decrease the sample bias, the final distribution platform used to gather a comprehensive and abundant sample size, was the consumer platform Prolific Academics. Some preference requirements used in the recruitment of respondents through Prolific Academics included nationality (Norwegian, Italian, French), age (18+), gender (male/female), and a request for participants who regularly buy groceries at the grocery store. This contributed to reaching a wider specter of participants, from various geographic regions, mainly Norwegian, Italian, and French consumers. The reason for the specification of participants being 18+ years old was based on the objective of the study, as the research is interested in consumers that do shop groceries and cook on a regular basis. Besides the nationality and age, the research study does not target any specific demographic group. Nevertheless, the demographic variables were added to the questionnaire, as it provides a possibility for comparison. The sample size of the original data collection ended up consisting of 404 respondents.

3.2 Procedure

The objective of the survey was to identify consumers' emotional reactions and attitudes towards different imperfections in fruits and vegetables, and further evaluate whether disgust sensitivity as an individual trait would influence these reactions. From there, the main goal was to see how these factors influence consumers' willingness to purchase these types of products. Thereby, to explore consumers' visual attention and reaction to various degrees of imperfections, eight apples were used as eight different conditions and varied in their degree of imperfection/abnormality (*apple 1* = perfect, *apple 2* = bruised, *apple 3* = color spots, *apple 4* = crushed_1, *apple 5* = crushed_2, *apple 6* = misshaped, *apple 7* = rotten_1, *apple 8* = rotten_2). Apples were chosen as the experimental conditioned product as this is one of the most widely consumed fruits in the world (O'Rourke, 2015; Jaeger et al., 2016). This made it a highly relevant product for investigation. The images used in the survey are illustrated below, along with a larger visual representation of the apple imperfections included in appendix 3. To make the visual experiment as realistic as possible, images of real apples with real and natural imperfections were used. The images of the external defected apples have already been pre-tested and approved by Jaeger and Antúnez et al. (2018), as they were used in a previous study

regarding quality perceptions based on external appearance. The images were granted to be used in this study by Sara R. Jaeger.

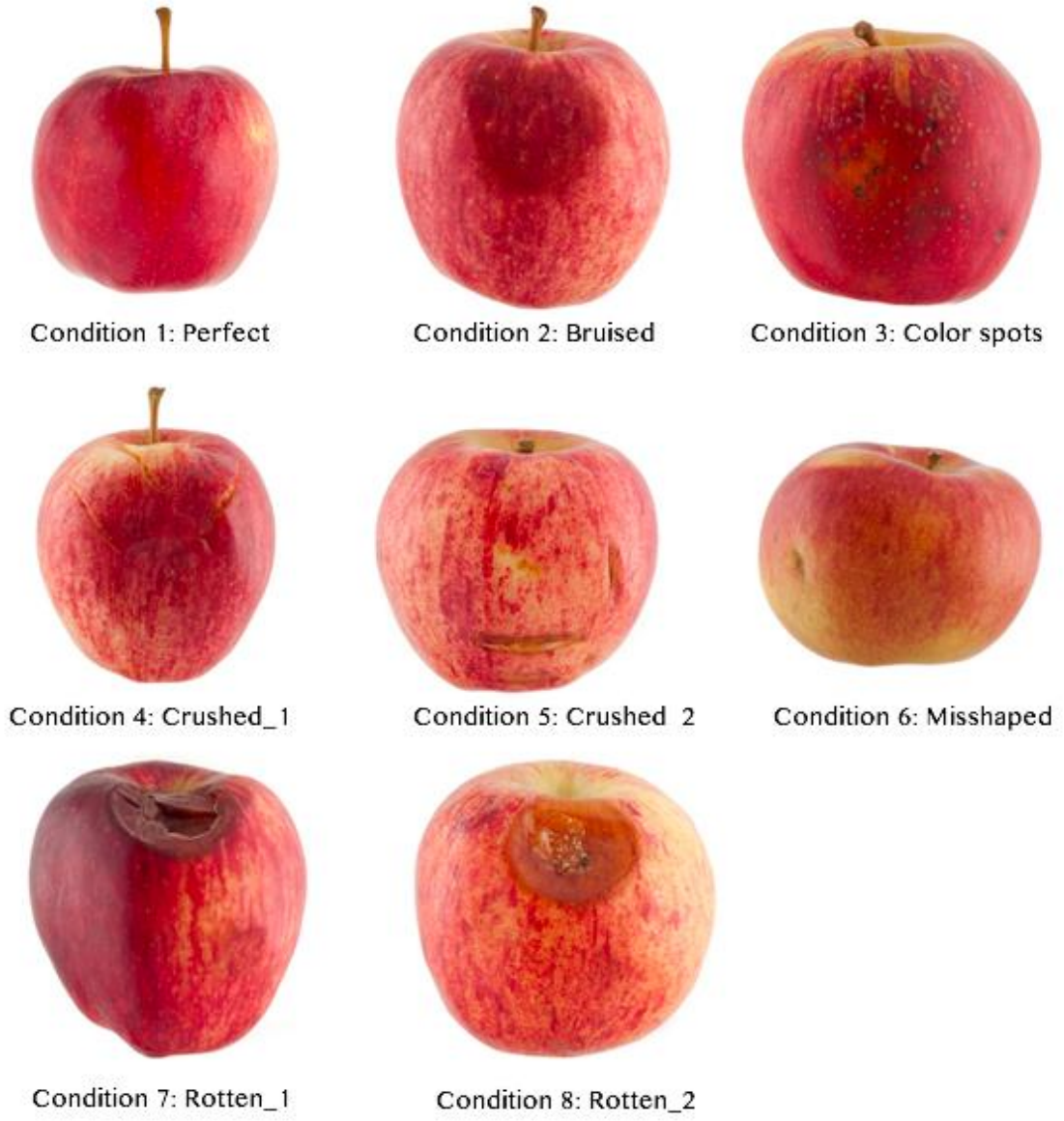

Fig.3: Apple images with varying degrees of imperfections used as different conditions in the experimental survey.

The participants were randomly assigned to one of the eight conditions. Then, depending on their assigned condition, they expressed their emotional reactions towards the apple by rating on a 7-point Likert scale to which extent they felt the emotions described in section 3.3.1. In the following, they reported their attitudes toward the apple, before they expressed their willingness to purchase. The participants also indicated their willingness to consume, by rating to which extent they agreed with six different consumption statements (see appendix 2). Furthermore, participants' safety concern was evaluated, along with the extent to which they

perceived the apple to be abnormal, or imperfect. Finally, participants were exposed to a disgust scale, measuring their disgust sensitivity as an individual trait. In the end of the survey, participants were asked about their grocery shopping and cooking habits, along with some demographic variables.

3.3 Survey measures

3.3.1 Emotional reaction

The emotions that were tested as a response to the imperfect apples the consumers were exposed to in the questionnaire were *disgust*, *contempt*, *uncertainty*, *anger*, *fear*, and *sadness*. For every emotion included, the participants rated on a 7-point Likert scale to which extent they felt the stated emotion, from "not at all" to "very much". For each emotion, two or three equivalent terms were used to strengthen the internal validity of the measured emotional reaction.

3.3.2 Attitude

The attitude scales required the participants to rate their attitude towards the apple they were exposed to, using a bipolar matrix table. The survey included two different attitude measures. Items used for the first attitude measurement were: *dislike it very much/like it very much, unfavorable/favorable, negative/positive, bad/good,* and *undesirable/desirable.* It constituted a 7-point Likert scale, and the participants' attitudinal measures will further be averaged to obtain the mean scores, in which higher scores will indicate more positive attitude towards the imperfect apple. The second attitudinal measurement involved further ten items in a new bipolar matrix table, also with a 7-point Likert scale. The items used can be seen in appendix 2b.

3.3.3 Safety concerns

In terms of testing whether participants' perception of risk influences their willingness to purchase, a 7-point Likert scale measuring safety concerns were included in the survey, consisting of 4 items; *unsafe, dangerous, likely to make you sick,* and *harmful*.

3.3.4 Perceived abnormality

A crucial element needed to answer the research question is the participants' perception of the degree of abnormality, or imperfection, of the apple. This was measured using the four items; *abnormal, wrong, tainted,* and *improper*, in combination with an image of the conditioned apple. The measure involved a 7-point Likert scale, where the participants rated the extent to which they perceived the apple to be "not at all"/"very much" in line with the mentioned items.

3.3.5 Willingness to purchase and consume

The participants' purchase intention was measured by three items in a bipolar matrix table, with a 7-point Likert scale (see appendix 2 for more details). Additionally, the intention to consume was measured on a 7-point Likert scale, using six statements related to consumption, where participants had to rate the extent to which they agreed with these (1 = not at all, 7 = very much).

3.3.6 Disgust sensitivity

For measuring disgust sensitivity as an individual trait, the disgust scale originally developed as a 32-item scale by Haidt, McCauley and Rozin (1994) was appropriate to use in the survey. However, the original scale has later been refined through the conduction of an item analysis. The results suggested a refinement by removing 7 of the items from the scale, as they were proved to contain limitations and item content overlap (Olatunji et al., 2007). This revised model provides a more internally consistent assessment of disgust sensitivity than the original including all the variables (Olatunji et al., 2007). The survey therefore included the refined disgust scale to measure individuals' disgust sensitivity. The aim was to see if this affects consumers' emotional reactions when exposed to imperfect fruit, and thereby their acceptance or rejection of purchasing imperfect products. The scale and items included can be seen in appendix 2b.

3.4 Pre-test

In the questionnaire development process, a pre-test was conducted on a sample of participants (n = 10) within the respondents' criteria, and ranged from 24-30 years old. They completed the survey and were asked to provide feedback on the questions and the different measures, as well as communicate what was possibly unclear or easily misinterpreted. The goal was to identify and eliminate potential issues with the designed survey, before the final distribution (Malhotra, 2010). In the aftermath of the pre-test a few changes were made to the survey. Among others, some formulations were changed to make it easier for the participants to understand and interpret the question/statement. Additionally, a few changes were made to the terms used in the scales measuring disgust sensitivity. This included splitting the statements into three pages rather than two, to make it easier to interpret. Moreover, as Olatunji et al. (2007) suggested further refinements of the disgust scale to include a distillation of the items to be rated on a 5- or 7-point scale as opposed to the nominal option "true/false", this was originally used in the survey during the pre-test. The participants were to rate how disgusting they found the

statements on a 7-point scale, ranging from 1 = "not at all" to 7 = "very much". However, through the pre-test, the feedback indicated that this scale made some of the statements confusing. The pre-test respondents stated that they found it hard to know what to answer on some statements, as they were formulated in a way that did not really fit with the scale items. Therefore, the original items with "true/false" were reinstated, and they are the ones used in the survey.

3.5 Data cleaning

All data collected through the Qualtrics Survey Software was transferred to SPSS Statistics version 25, for further analysis. This was thereby the main software used for the data analysis, along with an additional tool from process macro version 3, downloaded to SPSS. Through a 'cleanup' in the dataset, 67 respondents were excluded based on uncomplete answers and considerable missing values. The remaining respondents were therefore 337 participants that were used in the following analyzes.

3.6 Descriptive statistics

The distribution of males and females included 44.5% males (*n* = 150) and 55.5% females (*n* = 187). The ages ranged from 18 all the way to 71. However, the majority of the participants were in their twenties, with 67% ranging from 20-29 years old (*mean* = 29.54, *SD* = 10.87). The geographic distribution of the participants includes mainly Norwegians (*n* = 182), Italians (*n* = 114) and French (*n* =30) participants (see appendix 4.3 for more details). Furthermore, the descriptive statistics for the educational level of the participants showed that the majority are, or have, completed either an undergraduate degree (*n* = 115) or a master's degree (*n* = 132), and together make up 73.3 % of the sample. Regarding occupation, most participants were either students (*n* = 157) or employees (*n* = 117), representing in total 81.3% of the sample.

In terms of the participants' grocery habits, the majority answered that they "usually" (*n* = 89), "most often" (*n* = 72), or "always" (*n* = 87) do the grocery shopping for their household. In total, these three answers constituted 73.5 % of the sample, leading to a left-skewed distribution as can be seen in the bar-chart to the right. This is positive for the current study and the analyzes,

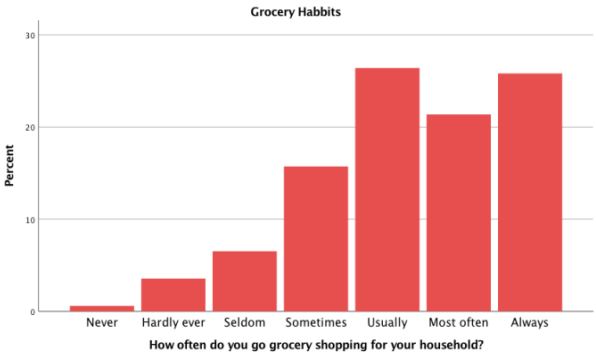

Fig.4: Bar-chart illustrating participants' grocery shopping habits

as most of the participants regularly go grocery shopping and therefore constitute a part of the population that fulfills a requirement of the target segment. This is based on the purpose of the research question in which the goal is to see how imperfections in fruit and vegetables affect consumers' purchase intention in the purchase situation. Furthermore, the distribution of participants' cooking habits seems somewhat coherent with their grocery shopping habits. In total 71.2% answered that they do cook at home either "usually" (n = 70), "most often" (n = 94), or "always" (n = 76). These answers show that the sample is representative of the desired target group, including people that regularly cook and do grocery shopping for their household (see appendix 4.4 for full description).

3.7 Data Analysis

3.7.1 Reliability

Before conducting further analysis based on the measured variables in the survey, a test of the internal consistency of the various measures was conducted. Cronbach's alpha was used as a reliability measure calculated in SPSS. The objective was to evaluate the correlation between the items meant to measure the same concept. An optimal Crohnbach's alpha ranges between .70 and 1 to be reliable (Gripsrud, Olsson & Silkoset 2010).

A reliability test was first conducted for the various emotional reactions, in order to evaluate the internal consistency of the emotions. The various Cronbach's alphas were the following:

Disgust (3 items; revulsion, aversion, disgust):	α = .904
Contempt (3 items; contempt, scorn, disdain):	α = .919
Uncertainty (3 items; suspicion, skepticism, uncertainty):	α = .885
Anger (3 items; mad, angry, annoyed):	α = .784
Fear (2 items; threatened, scared):	α = .843
Sadness (2 items; sad, discouraged):	α = .817

Seeing that the alphas for all the emotional measures, except for 'anger', were greater than .80, the results are considered 'very good' (Janssens, Winjen, De Pelsmacker, & Van Kenhove, 2008). Anger, with an apha of .784, it is still above .70 and close to .80, and is thereby considered 'good' and heterogeneous (Janssens et al., 2008). Thus, all measures for the various emotional reactions evaluated in the study are proved reliable.

Furthermore, reliability tests were conducted for both attitude measures, and resulted in a

Cronbach's alpha for the first attitude measure greater than .80 (5 items; α = .958), and the same for the second attitude measure (10 items; α = .948). Additionally, the results for safety concerns (4 items; α = .896) and abnormality (4 items; α = .909), also had good internal consistency within their measurement, both with alpha > .80. Finally, both the purchase intention measures (3 items; α = .996) and the measure for consumption intention (6 items; α = .952) gave very good results in terms of internal consistency. Based on these Cronbach's alpha calculations, none of the indicators within any of the measures used in the survey needed to be excluded, as they are all reliable measures. They will thereby be used in the following analyzes to answer the research question.

As a starting point, an identification of the least desirable apple imperfection is necessary to further analyze what factors influence this perception, and which emotional and attitudinal reactions this will lead to. Before conducting the analyzes, the variables in the SPSS file was transformed and computed into fewer variables. This was done by calculating the mean score of various indicators for the different measures used in the study, and compute them into one variable. For example, for measuring the disgust emotion, the variables within this measure (*revulsion*, *aversion*, *disgust*) were computed into one variable, called 'disgustmean' in the SPSS file. The same procedure was done for all the remaining measures to simplify and make the analyzation results clearer.

3.7.2 Perceived abnormality

A One-Way ANOVA was first conducted to see how the different conditioned apples were perceived in terms of abnormality. The result shows that there are significant differences in the perception of abnormality among the different imperfections. The significance value for all four items measuring abnormality is < .05, indicating that there are significant differences in the level of perceived abnormality between the various imperfect apples. To find which ones are perceived to be the most imperfect or abnormal, a mean comparison test was analyzed. It showed that the three conditions 'crushed_1', 'rotten_1', and 'rotten_2' were the apples perceived to be the most abnormal. The former had the highest mean score (*mean* = 3.10, *SD* = 1.60) out of all the conditions, whereas 'rotten_2' (*mean* = 2.96, *SD* = 1.60) and 'rotten_1' (*mean* = 2.92, *SD* = 1.51) had a closely perceived degree of abnormality. A visual display of the three apples can be seen below, and a more detailed view of the various means can be found in appendix 5.

Fig.5: Images illustrating the three apples perceived to be the most abnormal, along with the mean scores of abnormality and standard deviation.

Even though these are the ones perceived to be the most abnormal, the scores are still surprisingly low, seeing that none of the conditions even got a score above 4 on the 7-point Likert scale. A possible explanation for this could be the 'compromise effect', in which people tend to choose middle options rather than very extreme ones, particularly when options are difficult to evaluate and when they have no strong preferences or aversions (Soman, 2015). Soman (2015) thereby emphasizes the importance of understanding the discrepancies between prediction based on market research and reality. As the survey data was collected in a context that is different from the context in which the actual choice is being made, this could affect the outcomes. The apples might evoke stronger perceptions of abnormality when met in a purchase situation where consumers would have to actually make a purchasing-decision. This might not be accurately reflected in the survey scores. Nevertheless, a clear distinction between the most and the least perceived abnormalities is brought forth by the results, as the three apples above are significantly differing in their abnormality scores compared to the less imperfect apples. The three least perceived abnormal apples were the 'perfect' condition (*mean* = 1.31, *SD* = .53), the 'color spots' condition (*mean* = 1.71, *SD* = .97) and the 'misshapen' condition (*mean* =

1.76, *SD* = 1.11). This shows that some apples are perceived to be more abnormal than others based on their external imperfections, regardless of the overall values not being at the top of the abnormality scale.

3.7.3 Willingness to purchase and consume

An additional One-Way ANOVA was conducted with the apple condition as the factor (independent variable) and the measure for 'willingness to purchase' as the dependent variable. This test was conducted to find whether the various conditioned apples have significant influence on consumers' willingness to purchase. The results would thus contribute to answer hypothesis 1. From the mean values in all the three measure for willingness to purchase, the 'perfect' and the 'misshapen' condition have the definite highest values, with an average mean for purchase intention of 4.15 (*SD* = 2.24) and 4.28 (*SD* = 1.58). On the contrary, the condition with the lowest score values was 'rotten_1', which is also one of the apples perceived as the most abnormal, with an average mean for purchase intention as low as 1.58 (*SD* = 1.04). This indicates that consumers are not willing to purchase this apple based on its imperfection. Additionally, both 'crushed_1' and 'rotten_2' scored relatively low on average purchase intention, with mean values of 2.06 (*SD* = 1.31) and 2.22 (*SD* = 1.71) (see Appendix 6 for a more detailed description of all the conditions). Lastly, the ANOVA significance levels confirm that the various conditions have significant effects on participants' willingness to purchase (*sig.* < .001).

The same test was conducted for the intention to consume, again with condition as the independent variable. Just like with 'willingness to purchase', the significance level shows that the various conditions do significantly impact participants' willingness to consume (sig. < .001). Moreover, equivalent to the conditions with the highest purchase intention, the two conditions that scored highest on intention to consume was the 'perfect' (*avg. mean* = 5.01, *SD* = 1.45) and the 'misshapen' condition (*avg. mean* = 4.46, *SD* = 1.36). On the contrary, the condition with the lowest score on purchase intention was the 'rotten_1' condition (*avg. mean* = 1.48, *SD* = .65), along with 'rotten_2' (*avg. mean* = 1.90, *SD* = 1.17). Whereas the purchase intention was lower for 'crushed_1' than the 'rotten_2' condition, the order of the two were switched for the consumption intention. However, for both willingness to purchase and to consume, the 'rotten_1' was the absolute "worst" condition based on mean score values, followed by 'chrushed_1' and 'rotten_2'. As seen above, these are also the three conditions

perceived to be the most abnormal, which indicates that increased severity of abnormality decreases both the willingness to purchase and consume.

A summarizing descriptive table of the mean values from the two ANOVAs are visually displayed below. The color code constitutes an illustration of the highest versus the lowest mean scores (green = high scores, red = low scores).

	N	Mean	Std.Deviation
perfect	46	5,01	1,45
bruised	39	3,69	1,61
color	40	3,13	1,41
crushed_1	40	2,02	1,07
crushed_2	46	2,39	1,02
misshapen	42	4,46	1,36
rotten_1	43	1,48	0,65
rotten_2	41	1,90	1,17
Total	337	3,03	1,73

Tables 1: Average mean values for consumers' willingness to consume based on exposure to the various conditions

	N	Mean	Std.Deviation
perfect	46	4,15	2,24
bruised	39	3,60	1,77
color	40	2,93	1,60
crushed_1	40	2,06	1,31
crushed_2	46	2,72	1,37
misshapen	42	4,28	1,60
rotten_1	43	1,58	1,04
rotten_2	41	2,22	1,71
Total	337	2,95	1,85

Tables 2: Average mean values for consumers' willingness to purchase based on exposure to the various conditions

3.7.4 Safety concerns

A final One-Way ANOVA was conducted on safety concerns in relation to the various conditions. The result shows that participants' safety concerns varied significantly based on the different conditioned apples (*sig.* < .001), which might explain the variation in the purchase and consumption intention. The same apples that were perceived to be the most abnormal and the least desired to purchase and consume, also scored highest on safety concerns. Nevertheless, the overall values were relatively low, similar to the scores for abnormality. No condition got a score above an average mean of 3. A mean comparison showed that the 'rotten_2' condition were perceived to be the least safe apple to eat, based on all four safety measures (unsafe: *mean* = 2.88, dangerous: *mean* = 2.59, likely to make you sick: *mean* = 2.88, harmful: *mean* = 2.68), with an average score for safety concern at 2.76 (*SD* = 1.64). Coherent with the most abnormal conditions, the second and third least safe rated conditions were 'crushed_1' (*avg. mean* = 2.63, *SD* = 1.47) and 'rotten_1' (*avg. mean* = 2.49, *SD* = 1.39). An interesting finding here, is that 'rotten_2' scored highest for safety concern, indicating that the highest risk perception is related to eating this apple, even though this is not the most abnormally perceived apple. However, it is still one of the three "worst" apples, and there are no significant differences between the three (see appendix 7 for more details).

Based on these findings, along with findings from previous research, the perception of abnormality as well as safety concerns are indications that negative emotions, like disgust, will be salient when participants are exposed to the different conditions, particularly the three least desirable. An expectation is that the negative emotional reactions towards the three least desirable conditions will be much more present than with the others, particularly compared to the 'perfect' and 'misshapen' conditions.

3.7.5 Emotional reactions

To see how the different imperfections influence the strength of various emotional reactions, a multivariate analysis of variance (MANOVA) was conducted, including all the different emotions; disgust, contempt, uncertainty, anger, fear, and sadness. The objective was to see whether there were significant differences between the emotions elicited by the various conditions, as well as which emotions were the most salient for the apples that participants expressed their lowest willingness to purchase and consume.

The MANOVA results showed that the least desirable apple conditions elicited the strongest negative emotional reactions among the participants. In contrast to the conducted ANOVA where 'rotten_1' scored lowest on willingness to purchase, the MANOVA results showed that the 'rotten_2' condition had the absolute highest score on every negative emotion. Nevertheless, the multiple comparisons table from the Post Hoc tests shows that there are not significant differences between the two (see appendix 8). Moreover, the three emotional reactions with the highest mean score for the least desirable conditions were *disgust* ('rotten_2': *mean* = 4.21, *SD* = 1.55, 'rotten_1': *mean* = 3.95, *SD* =1.69), *contempt* ('rotten_2': *mean* = 3.49, *SD* = 1.55, 'rotten_1': *mean* = 2.87, *SD* =1.91), and *uncertainty* ('rotten_2': *mean* = 3.70, *SD* = 1.75, 'rotten_1': *mean* = 3.30, *SD* =1.67). Again, the three same conditions that scored the lowest on purchase intention were the ones with the highest scores on all the negative emotions associated with the apple. The two conditions with the highest scores on purchase intention, were also the two with the overall lowest values on the negative emotions. Further, the Post Hoc test confirms the distinction between the two "worst" and "best" conditions, by showing which conditions are significantly different from each other based on the emotional reactions they evoke. The 'rotten_1' and 'rotten_2' are not significantly different from each other for any of the six emotions, indicating that they evoke similar degrees of negative emotions. The same applies to the 'perfect' and the 'misshapen' condition, in which these evoke

similar low degrees of the negative emotions. Finally, the box's test of equality of covariance matrices shows a significant value (< .001), which means that the emotional reactions are significantly different from each other depending on the various conditions. This is also confirmed by the significant Pillai's Trace value in the Multivariate Tests (*sig*. < .001).

3.7.6 Attitudes

In addition to testing what emotional reactions are elicited by the exposure to the various apples, a MANOVA was conducted to see how the participants' attitudes were affected. All attitude measures were transformed into two variables, in which the mean value for the attitude indicators were computed. The first variable involved the participants' overall attitude towards the apple they were exposed to, whereas the second attitude variable consisted of their overall rating of the apple based on various attributes (see details of attitude measures in appendix 2b). The results show that the distinction between the negative attitudes towards the least desirable imperfect apples, and the most perfect ones, are not as clear as the negative emotional reactions elicited towards the same apples. Overall, there are small differences between the eight conditions, and the only ones significantly differing from the rest are the 'rotten_1' and 'crushed_1' (see appendix 9). The absolute lowest mean value for the first attitude variable is 2.56 (*SD* = 1.09) for the 'rotten_1' condition, and the highest is 3.75 (*SD* = 1.78) for the 'misshapen' condition. For the second attitude variable, the lowest value is 2.60 (*SD* = 1.01) for 'rotten_1', and the highest value is 4.03 (*SD* = 2.16) for the 'perfect' condition. These rather small differences indicate that the participants' emotional reactions are more affected by the apples than their attitudes. This could be because the emotions are antecedents of participants' attitudes, making the emotional reactions appear stronger and more present than their attitudes. Furthermore, seeing that none of the apples were rated above 4 (on a 7-point scale), this shows that even perfect apples or apples with small abnormalities do not elicit very positive attitudes, simply less negative attitudes. This could be explained by consumers today expecting fruit and vegetables to be perfect, and therefore do not express positive emotions or attitudes when they get it. They rather gets discouraged and express negative attitudes when they do not get an apple that is perfect. Nevertheless, despite the small differences and low values, the MANOVA further confirms which apples are the least desirable, as the same three apples scored lowest also on positive attitudes.

The findings from the analyzes above, show that the least desirable and the most perceived abnormal apples evoke the strongest negative emotions, particularly disgust, contempt, and

uncertainty. The same apples also score lowest on all positive attitudes. Thus, there are significant differences in terms of which emotions are elicited by the different apples, along with varying degrees of evoked negative attitudes. Furthermore, it would be interesting to see if there exists a mediation effect between condition and purchase intention, through emotional reactions, leading to attitudes toward the apples. Additionally, it would be interesting to investigate whether these emotional reactions in any way are affected by individual' disgust sensitivity.

3.8 Conceptual models

For further analysis aimed at answering the research question, two conceptual models developed by Andrew F. Hayes were used to test for mediation effects, as well as to investigate the existence of a moderation effect based on disgust sensitivity. The models used are number 6 and number 83 from Hayes' (2018) collection of conceptual models included in his process macro (see appendix 10 for original models). Model 6 includes a double mediation effect, in which the results will support or reject hypothesis 2. Model 83 is a conditional process model, involving a combination of both a mediation and moderation analysis. This model focuses on the estimation and interpretation of the conditional nature (moderation component) of the indirect and/or direct effects (mediation component) of X and Y in a causal system (Hayes, 2018). Model 83 was thus used to see whether the third hypothesis would be confirmed. The two models are depicted below, in which the illustrations include the variables used in the conducted analyzes.

Model 6

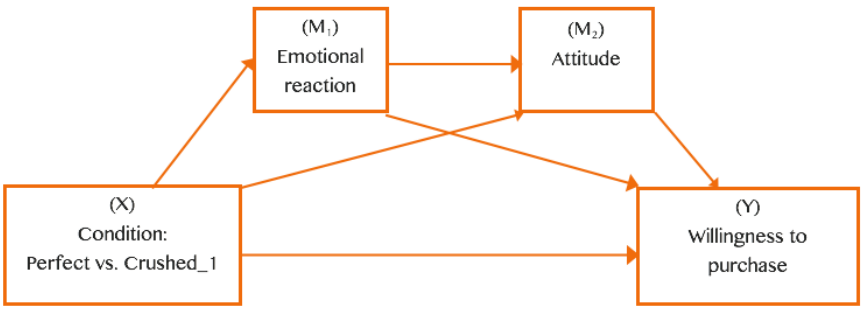

Fig.6: Illustration of model 6 including the variables used in the analysis in the process macro

Model 83

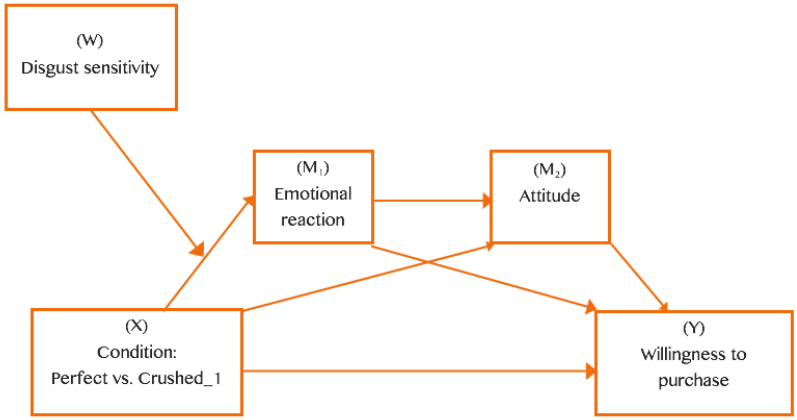

Fig.7: Illustration of model 83 including the variables used in the analysis in the process macro

As illustrated, the independent variable, also called antecedent variable, is the condition variable (X), in which the 'perfect' condition and the 'crushed_1' condition are compared. Further, consumers' emotional reaction (M_1) was included as the first mediator in a serial mediation, with their attitude (M_2) as the second mediator. For the model 83, the total individual disgust sensitivity (W) was included as the moderator variable. Finally, the dependent or consequent variable in the model was willingness to purchase (Y), as the goal was to see how a perfect versus imperfect apple influence consumers' purchase intention through the two mediators, possibly moderated by individuals' level of disgust sensitivity.

An inclusion of more than one mediator between an antecedent (apple condition) and a consequent (willingness to purchase) allows one to look at competing theories of mechanisms against each other (Hayes, 2018). The involvement of the two mediators in the model, allows for a formal comparison of size of the indirect effect of X through M_1 and M_2, to see which of the two mediators have the strongest effect on Y (Hayes, 2018). Multiple mediator models can involve mediators that are causally linked to each other in a serial multiple mediator model, or simply correlate in a parallel multiple mediator model (Hayes, 2018). In the models above, the mediators are causally linked, in which emotional reaction is suggested to further lead to an attitude, which then affects willingness to purchase. For the model including the moderator, the process linking the apple condition to willingness to purchase through emotional reaction and attitude, is moderated or conditional based on the individual's degree of disgust sensitivity, which explains the term *conditional process model* (Hayes, 2018). The moderator is functioning as a moderation of only the indirect effect of X on Y, through M_1 and M_2.

3.8.1 Explanation for included variables

Before implementing the variables in the model, analyzes were conducted in SPSS to find which items were to be included within each of the variables. A first step included conducting a factor analysis on the different emotional variables to find the variability among them. This revealed that the variables for disgust (*revulsion, aversion, disgust*) were somewhat spread across the matrix, indicating that these needed to be tested as an excluded variable by itself. From the test of Cronbach's alpha, it was found that the internal consistency within the total disgust variable was reliable (see paragraph 3.7.1). Moreover, the factor analysis indicated that disgust and uncertainty seemed to be the most interesting to use in the analysis, based on the different emotion variables in the study. Therefore, as disgust was the most salient emotional reaction with the highest scores for the apples that was found to be the least desirable, this was used as the first mediator (M_1) in the model.

Furthermore, the second mediator variable was participants' attitudes toward the apple, seeing that they presumably are formed by consumers' immediate emotional reactions toward the apple's physical appearance. A factor analysis was conducted to find which items were covarying and appropriate to use as a part of the serial mediation model. After conducted factor analysis, the total variance explained shows that there were two factors with an eigenvalue above 1. Further, the pattern matrix shows that the ten attitude variables in the second attitude measure belonged to one factor, related to the apple's degree of appetite, quality, and attractiveness, and the remaining five variables for the first attitude measure belonged to another. With the first mediator as disgust, which has been described as a defense against a universal fear of death (Rozin et al., 2000), the second attitude measure was implied to be the most relevant for the analysis, as the items included are more related to pathogen disgust and fear of contagion. A new factor analysis was thereby conducted on the ten variables from the second attitude measure, and the factor values further implied a division of the items into two separate dimensions. Although the analysis did not show two distinct factors, as most of the values where rather high, the factors were still divided based on variables with a value of .9 and .8, as well as one variable with .7. The variables with values > .9 in the pattern matrix, were the ones mostly related to the symptoms of disgust, and included the following: *Undesirable* (.937), *Not appetizing* (.924), *Not appealing* (.917), *Not attractive* (.912), *Unacceptable* (.908). These variables were combined in a new variable, and called the "undesirable factor", and this is the one used as the attitude mediator (M_2) in the model.

For model 83, the moderator variable constituted the total disgust sensitivity score for the individual participants. To understand what this concept entails, a clearer description of the disgust sensitivity is needed. Previous research have described disgust in various ways, and it has been seen an emotional response that can be divided into various categories. This is based on the exposure triggering different domains of people's disgust sensitivity, leading to feelings of disgust. In Haidt et al.'s (1994) original disgust scale, they divided disgust into eight domains, including food, animals, body products, body envelope violations, death, sex, hygiene, and sympathetic magic. However, in the paper of the revised disgust scale, Olatunji et al. (2007) provide three subscales of disgust sensitivity, as opposed to the eight, divided into the domains; core disgust, animal reminder disgust, and contamination-based disgust. These are the domains that the disgust scale used in this study are based on. However, Tybur et al. (2009) contradicts these three domains as an internally consistent division of disgust, and instead derive three new domains; pathogen, sexual, and moral disgust. They further claim the two latter domains to have been largely ignored, and indicates that the disgust scale by Olatunji et al. (2007) involves constructs that are strongly related to sensitivity to pathogen disgust, which functions to avoid infectious microorganisms. This type of disgust sensitivity is relevant in areas involving contagion and disease (Tybur et al., 2009). This indicates that participants' total disgust sensitivity used as a moderator in model 83 most likely will be linked to the attitude constructs involved in the chosen "undesirable factor", as this is more related to risk of contamination, elicited by pathogen disgust sensitivity. According to Tybur et al. (2009), this is the overall domain covering the three domains of Olatinji et al.'s (2007) disgust scale.

Finally, to test how imperfection affects purchase intention, through both mediators and possibly a moderator, the dependent variable consisted of the perfect condition versus an imperfect condition. Since the three least desirable apples were crushed_1, rotten_1, and rotten_2, these would be the most interesting to test compared to the perfect conditions. The aim would be to see how people's emotional reactions and attitudes are affected and further influence the willingness to purchase based on these two contradicting conditions. For the test to give the most realistic results, the apple chosen for the model was crushed_1. This is because it is rather unlikely that consumers would be exposed to the two rotten conditions in a store setting. Instead, it is more likely to meet a crushed_1 type of apple, in which consumers would have to evaluate whether this is an apple they would like to purchase or not. Therefore, the analysis was run with the conditions perfect versus crushed_1. These variables were recoded into dummy variables of 0 (perfect) and 1 (crushed_1), before implemented in the analysis.

3.8.2 Recoding and preparing variables

Based on Olatunji et al.'s (2007) description of the use of the disgust sensitivity scale data, the responses had to be recoded in the SPSS file to fit the measures intended for the analysis. All the false (1) answers on the disgust sensitivity measure were recoded to 0, and the true (2) were recoded to 1. Further, three of the variables had to be reversed, as they were formulated in a way that indicated opposite answers than the rest of the statements (Olatunji et al., 2007). These were statement number 1, 3, and 7, in the first disgust sensitivity scale with true/false as the nominal values (see appendix 2b). Moreover, the second disgust sensitivity scale was also recoded, in which 1 (*not disgusting*), 2 (*slightly disgusting*) and 3 (*very disgusting*) were recoded into 0, 0.5, and 1. Finally, the total disgust sensitivity for each participant was calculated from the sum of all 25 variables included in the scale (Olatuji et al., 2007). This was computed into a new column in the SPSS file called "Total Disgust Sensitivity", which is the variable used in the analysis as the moderator.

The first model analysis conducted was model 6, without the moderator variable. The total sample size in the model, including only the two conditions "perfect" versus "crushed_1", consisted of 86 participants. After conducting and analyzing the results of model 6, the second analysis is conducted on model 83, including an evaluation of a possible moderation effect.

4.0 Results

The following sections involve an analyzation of the conceptual models conducted, along with an interpretation of the findings based on the survey data related to the research question and the hypotheses.

4.1 Interpretation of model 6 results

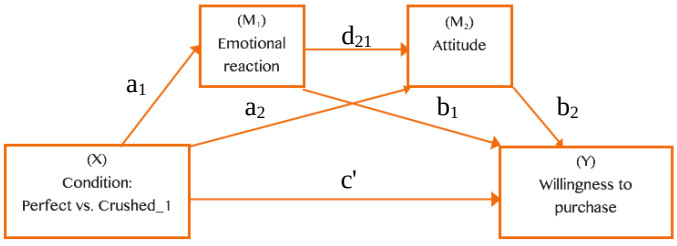

Fig.9: Illustration of model 6 along with the statistical effect coefficients

From the double mediation model analysis, the data output shows that condition (perfect versus crushed_1) both directly and indirectly influences consumers' willingness to purchase. The indirect effect consists of the double mediation through the condition's effect on emotional reaction (a_1), which further influences attitudes towards the apple (d_{21}), and thereby predicts purchase intention (b_2). To break it down, the first outcome variable indicates that condition predicts disgust as an emotional reaction (a_1 = 1.4996), which means that the disgust reaction will be higher for the crushed_1 condition compared to the perfect condition. As can be seen from table 3 below, the effect is significant, with an R-squared indicating that condition explains about 32% of the variation in the emotional reaction of disgust.

Furthermore, the effect of condition directly on attitude is not significant ($p > .05$). Instead, a serial mediation effect is significant ($p < .05$), which means that the emotional reaction of disgust does further predict attitude. Moreover, the three variables condition (c'), disgust (b_1), and attitude (b_2), all have significant effects on the consequent variable willingness to purchase ($p < .05$). Additionally, the R-squared (.7514) indicates that 75% of the variation in consumers' willingness to purchase can be explained by whether the condition is perfect or imperfect, the strength of negative emotional reactions of disgust, and the degree of negative attitudes towards the apple. The various effects are depicted in the statistical model and table below, showing the coefficient, t-values, and p-values for the direct and indirect effects.

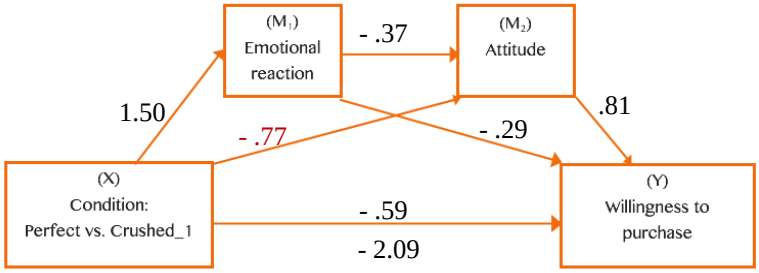

Fig.10: Statistical model 6 including the coefficients for the various effects from the analysis results

X → Y	c' = - .5938	t(82) = - 2.2030	p = .0304
X → M_1	a_1 = 1.4996	t(84) = 6.2697	p < .001
X → M_2	a_2 = - .7740	t(83) = - 1.6547	p = .1018
M_1 → Y	b_1 = - .2865	t(82) = - 2.7972	p = .0064
M_2 → Y	b_2 = .8083	t(82) = 12.9879	p < .001
M_1 → M_2	d_{21} = - .3670	t(83) = - 2.0840	p = .0402
X → Y	c = - 2.0938	t(84) = - 5.1954	p < .001

Table 3: Variable effects of model 6

In further analysis of the results, the unstandardized values are used in the interpretation of the model effects. This is because the use of standardized coefficients is not meaningful when the model includes a dichotomous antecedent (focal) variable, such as with the condition variable; perfect vs. crushed_1 (Hayes, 2018). Thus, from the indirect effect(s) of X on Y, the unstandardized bootstrap confidence interval confirms a significant total indirect effect. This means that the effect of condition on purchase intention is significantly mediated through emotional reaction of disgust along with attitude (*bootLLCI* = - 2.1729, *bootULCI* = - .7777).

The first indirect effect (*Ind1: X → M_1 → Y*) is also significant, and involves a single mediation effect from the condition, through the emotional reaction, to willingness to purchase. The significance is seen from the confidence interval in the unstandardized output (boot*LLCI* = - .7529, boot*ULCI* = - .0975). On the contrary, the there is no significance for the second indirect effect (*Ind2: X → M_2 → Y*), meaning that the effect of condition, through attitude, to willingness to purchase is insignificant. This is explained by the insignificant link between condition and attitude (a_2*: p* > .05), and is confirmed by the confidence interval (*bootLLCI* = - 1.2680, *bootULCI* = .0150). Thus, attitude by itself does not comprise a significant mediator between condition and purchase intention, without the emotional reaction as a first mediator. However, as the third indirection effect including both mediators is significant (*Ind3: X → M_1 → M_2 → Y*), this confirms the serial mediation effect (*bootLLCI* = - .7710, *bootULCI* = - .1614). These results confirm both hypothesis 1 and 2, in which a direct (main) effect on willingness to purchased based on condition is significant, as well as both a single mediation effect through emotional reaction, and a serial double mediation effect through both emotional reaction and attitude is confirmed significant.

4.2 Interpretation of model 83 results

Based on these findings of a significant serial mediation effect, model 83 further tested hypothesis 3, to see whether there existed a moderated mediation, by including total disgust sensitivity as a moderator. The term moderated mediation is used for an indirect effect of X on Y through $M_{(1)}$ which is moderated by W (Hayes, 2018). The goal was to see whether the mechanism represented by the chain of events from condition (X), through emotional reaction (M_1) and attitude (M_2), to willingness to purchase (Y) are operating in varying degrees (or not at all) for certain people based on their level of disgust sensitivity. Both a conceptual and statistical model are illustrated below, only focusing on the condition's effect on the disgust emotional reaction moderated by disgust sensitivity.

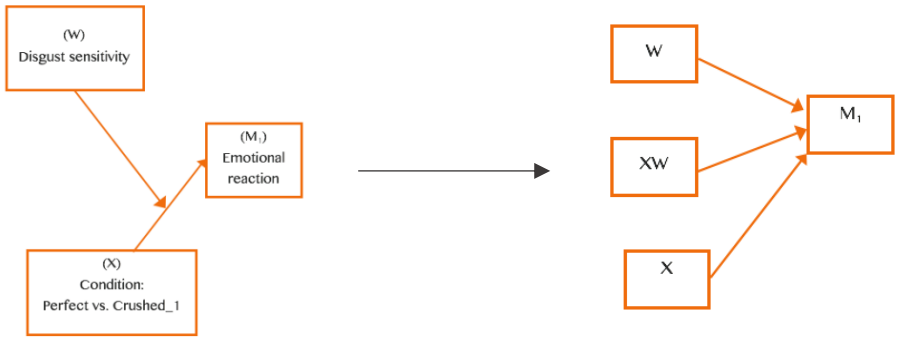

Fig.11: Moderation effect illustrated by conceptual and statistical models

From the model analysis conducted, the output data shows no significant effect of the moderator on the relationship between condition and emotional reaction of disgust. The model above illustrates the moderated mediation effect that was tested. The interaction effect, between the condition and disgust sensitivity on emotional reaction is thereby insignificant. It cannot be proved that the emotional reaction elicited when exposed to the condition is moderated by individuals' disgust sensitivity. Neither the effect of total disgust sensitivity alone on disgust emotional reaction ($W \rightarrow M_1$: $p = .6956 > .05$), nor the interaction effect of the condition and disgust sensitivity together on the disgust reaction ($XW \rightarrow M_1$: $p = .4063 > .05$) was significant.

Nevertheless, the data table visualizing the conditional effect still indicates that there are differences in the level of evoked feelings of disgust based on consumers' disgust sensitivity. The table below depicts that a clear distinction in evoked feelings of disgust varies for the different values of disgust sensitivity, particularly the values; 8, 12.75, and 18.04. The table shows that for both conditions, although mainly for the crushed_1 condition, the emotional reaction of disgust increases for higher disgust sensitivity scores.

Condition	TDS	Dis.mean
.0000	8.0000	1.2106
1.0000	8.0000	2.4574
.0000	12.7500	1.2769
1.0000	12.7500	2.7203
.0000	18.0400	1.3507
1.0000	18.0400	3.0131

Table 4: Moderation effect of individuals' total disgust sensitivity on emotional reaction based on condition (0 = perfect condition, 1 = imperfect condition)

The illustration shows that although the expected moderation effect is not significant, this does not mean that the path from condition to emotional reaction is not moderated by disgust sensitivity. According to Hayes (2018), real effects might sometimes be too weak to be able to detect through these analyzes, because of limitations of resources, or other things out of our control. Regardless, despite the illustrated moderation effect from the table above, the effect is not big enough to be significant, meaning that hypothesis 3 cannot be confirmed. The test 'index of moderated mediation' also affirms the insignificance (*bootLLCI* = - .0572, *bootULCI* = .0250). The fact that the effect is insignificant, even though there are visual differences in disgust reactions based on disgust sensitivity, can be explained by the rather extreme measures used in the disgust sensitivity scale. These might not affect the emotional reactions triggered simply by imperfect fruits or vegetables. Based on the items included in the scale, which involves more "severe" scenarios for disgust evoking feelings, the exposure to the apple might not be severe enough in comparison. The effect would most like have been more significant for phenomena that are more consistent with the ones described in the scale.

4.3 Research question answered

Based on the findings from the data analysis and the conceptual model analyzations conducted, the research question has been answered. As a reminder, the research question was:

What emotional reactions are elicited by the different kinds of imperfections in fruit and vegetables, and how are they affecting consumers' rejecting behavior in the purchase situation? What are the most distinct and least desirable abnormalities?

The most prominent emotional reactions elicited by imperfections in apples were found to be disgust, contempt, and uncertainty. The remaining emotions included in the survey – sadness, fear, and anger – were also stronger elicited for the apples identified as the least desired. However, for disgust, contempt, and uncertainty, the negative emotion scores involved a clearer separation between the least and the most desired apples. Furthermore, the findings from the conceptual models describe how these emotions are affecting consumers' behavior in terms of rejecting to purchase imperfect apples through a serial mediation effect. When comparing a perfect apple to an imperfect apple, varying degrees of emotional disgust reactions were elicited among the consumers. From this, the consumers' attitudes were affected, which again influenced their level of unwillingness to purchase. Moreover, the findings showed that there

are significant differences in consumers' willingness to purchase an imperfect versus a perfect apple, based on the salience of stronger feelings of disgust and thus more negative attitudes related to the apple's undesirability. However, the emotional reactions evoked by exposure to the apple condition, perfect versus imperfect, are not significantly affected by consumers' disgust sensitivity. There was not sufficient evidence to suggest that individual disgust sensitivity do explain why certain people have more negative feelings of disgust towards the imperfect apple and therefore lower willingness purchase. Nevertheless, the findings further contribute in answering the last part of the research question, depicted in section 3.7.2 and 3.7.3, where the crushed and rotten conditions are perceived to be the most abnormal apples, as well as the least desired. The latter involves both in terms of willingness to purchase and willingness to consume. The research question is also answered more specifically through the three hypotheses, and the table below involves a summary of the hypotheses results and conclusion.

Hypothesis	Conclusion
H1: *Varying degrees of imperfections in products will evoke varying degrees of emotional reactions, with more severe imperfections leading to stronger negative emotions and decreased willingness to purchase.*	Supported
H2: *An imperfect, compared to a perfect, product will lead to a lower willingness to purchase through evoked emotions of disgust, leading to negative attitudes towards the product.*	Supported
H3: *Higher individual disgust sensitivity will lead to stronger evoked feelings of disgust, and thereby more negative attitudes, leading to a decreased willingness to purchase imperfect products.*	Not supported

Table 5: Summary description of hypotheses results

5.0 Discussion

5.1 Discussion and conclusion

The study findings involve contributing information imperative for the research area regarding consumers' purchasing behavior related to imperfect fruit and vegetables. The results from the various analyzes conducted provide information regarding the negative emotions that are the most salient when consumers are being exposed to externally defected apples. These emotional reactions also vary the most based on whether consumers are exposed to a perfect apple or an imperfect apple, and particularly include disgust, contempt, and uncertainty. Additionally, the

findings show which imperfections are perceived to be the least desirable by the consumers, involving the crushed and rotten apple imperfections. These findings add important and revealing information about consumers and the reasoning behind their rejecting behaviors.

The results further indicate that consumers are rejecting the imperfect apples because of feelings related to disease-avoidance, safety concerns, and fear of contagion, which are all symptoms associated with evoked feelings of disgust. This also explains the elicited emotions of contempt and uncertainty, in which consumers do not even consider purchasing these products because of their uncertainty related to contamination and pathogen associations based on the product appearance. Coherently, the least desired imperfect apples also induced the most safety concerns among the consumers. Thus, the unfamiliarity of the external looks of the apples are making the consumers hesitant and avoidant, indicating that there is a lack of knowledge in terms of the edibleness of imperfect products among consumers. The findings are thereby implying that consumers need to be more informed of the fact that apple appearances do not speak to its' safety and edibleness. The insight gained from the conducted survey conveys that both lack of exposure to these products, leading to unfamiliarity of the product appearance, along with uncertainty and skepticism is leading consumers to reject imperfect products.

Moreover, the significant serial mediation effect shows that consumers' emotions are crucial in the process of inducing them to purchasing imperfect fruit and vegetables. This is because the emotional responses elicited by the apple imperfection are further forming consumer attitudes, and eventually influencing their willingness to purchase. This is based on the indirect effect from the apple condition, including a perfect versus an imperfect apple, to willingness to purchase, through elicited emotional reactions of disgust, leading to negative attitudes. This consequently causes consumers to reject purchasing imperfect products. Retailers therefore need to act in a way that will create positive emotional responses among consumers when exposed to varying degrees of imperfections in fruits and vegetables. By acknowledging that the imperfect fruit and vegetables that they are currently throwing out or rejecting are edible, it can make consumers feel guiltier by their contribution to unnecessary food waste. Additionally, it might even make them more motivated and thus inclined to purchase and consume imperfect products, as their emotional responses of disgust fades. These findings therefore affirm the importance of communication messages reassuring consumers that it is safe to eat products that do not look perfect.

5.2 Managerial implications

The fact that previous research have found price-discounts effective in inducing consumers to purchase suboptimal products, primarily related to shape, this might result from campaigns that have educated consumers on the harmlessness in eating weirdly shaped fruits. Additionally, it has contributed to consumers getting familiarized with the looks of the abnormally shaped fruits through continuous exposure. Consumers have therefore become more familiar with weirdly shaped fruits, and do no longer perceive it as disgusting or risky to eat. In fact, the current study findings revealed that the misshapen condition was almost consistent with the perfect condition for all elicited emotions and attitudes, as well as it had similarly low degrees of risk perception among the consumers. Furthermore, no significant differences in consumers' willingness to purchase and/or consume were found between the shape-imperfection and the perfect condition. This confirms that consumers are today used to seeing various shape abnormalities, as well as they have learned that there is no harm in consuming these products. On the contrary, the three imperfections proved to be the least desirable in the study – crushed_1, rotten_1, and rotten_2 – are much more 'foreign' and unusual to the consumers. They are therefore perceived to be more abnormal and evoke stronger negative emotions and higher risk concerns than shape abnormalities. This emphasizes the importance of making consumers more used to seeing these types of imperfections, and further increase their knowledge regarding the safety of eating these products, despite their visual looks. It is, as mentioned, necessary with intervention strategies that are based on the various emotions elicited by the different imperfections. By being aware of the consumers' emotional responses, an efficient intervention strategy should involve altering their perceptions and thereafter motivate people to purchase and consume these products.

This provides retailers with new information about what specifically make consumers reluctant to purchasing imperfect products. It gives them an advantage in coming up with sustainable intervention strategies meant to increase consumers' willingness to purchase. As mentioned in the discussion section, these strategies will depend on an education of consumers in terms of the edibleness of these products, which also will involve exposing consumer to these imperfections more often. Even though we have seen that retailers and supply chain actors have previously been refraining from displaying imperfect food in their shelves, because they assume consumers will not be willing to purchase (de Hooge et al., 2018), this will be a necessary step to take in making consumers familiar with the imperfections in the products. A huge responsibility is therefore upon the retailers, as their actions of displaying and marketing

various products have significant influence on consumers' perceptions of the products. However, it is now clearer exactly what emotional responses are evoked by the various imperfections, and how this is influencing consumers' willingness to purchase through induced attitudes. This can thereby give retailers and supply chain actors an idea of how to communicate to shape attitudes and eventually consumers' purchase intention.

Furthermore, as even the most severely perceived imperfections in the study still involved only a small part of the apple being defected, consumers should become aware of alternative uses for such apples. In line with Jaeger and Antúnez et al.'s (2018) suggestions, the encouragement of consumers to at least partially consume imperfect apples or to use them for alternative uses (e.g. cooking, baking) can contribute to a reduction in food waste. Particularly for the rotten imperfections, it might be more relevant in a consume versus not-consume situation at home, where consumers need to decide whether or not to throw out these products. However, if people are properly thought of the harmlessness of eating these products, this could lead to a decreased food waste also in the home situation, as people are more motivated not to throw away food based on imperfect appearances. For example, simply cutting off the rotten spot on the apple could be a solution, if consumers' thoughts of contamination and disgusted feelings are altered. Thereby, coherent with Jaeger and Antúnez et al.'s (2018) findings, the study results stress the need to make consumers aware that minor imperfections such as bruises, crushed parts, and deviations in color, should not influence their willingness to accept apples that deviate from the current high visual quality standards.

Lastly, as the rejection of imperfect products is assumed to also be connected to peoples' self-image and -perception (Grewal et al., 2019), this is an aspect that will need to be influenced. This is to possibly design a successful intervention strategy that will induce consumers to be willing to purchase 'ugly' fruit and vegetables. Such as with the campaigns for the shape-abnormalities in fruit and vegetables, marketing initiatives are also required to be implemented for other, more severe imperfections, particularly the least desirable identified in the study. This could be an aid in eliminating the beauty standards of fruit and vegetables, which would influence consumers' perceptions of imperfections in a positive way. It could eventually lead to no types of abnormalities being associated with contagion and health concerns through elicited emotions of disgust. This way, consumers' self-perception would not be negatively impacted by purchasing these types of imperfect products. In addition, positive, educational marketing campaigns could motivate consumers to purchase imperfect fruits as they will learn

that they are perfectly edible. Finally, by recognizing their own contribution in the reduction of a worldwide food waste by simply purchasing these products, this could lead to an increased purchasing motivation.

5.3 Limitations and future research

The study presents some limitations worth mentioning. Firstly, the survey conducted involves a gathering of data from consumers' self-reporting, which might involve some errors in terms of possible contradicting reported intentions from actual behavior. Thus, an important limitation involves the fact that there might exist discrepancies between the consumers' reported willingness to purchase the apples' in the study, and their actual purchasing behavior in a physical store setting. This is based on how the data is collected in a different context than the context in which the actual choice is being made (Soman, 2015). Additionally, it has been found that intentions not to waste food are not necessarily reflected in behavior (Stefan et al., 2013; Russell et al., 2017). This indicates that the results might not be reflections of real behavior when consumers are in the actual purchase situation. Future research might therefore consider observing consumers' purchasing behaviors in real choice situations, to see whether the current findings are replicated.

Another consideration that might act as a limitation in terms of the data results are individual consumer preferences. Even though individual disgust sensitivity turned out not to be a significant moderator, other individual preferences could affect the attitude scores and attribute ratings. This could involve people not liking apples or being allergic to apples. This might negatively affect their attitudes towards the apple, without it having to do with the illustrated imperfection. Thus, the study should have included a variable in which people could report whether they do not like, or are allergic to apples, so that one could control for this factor in the analyzation of the data. This is thus an aspect recommended to consider for future research studies. Moreover, as the current study uses apples as the imperfect product, the result cannot be generalized to all fruit and vegetables, seeing that previous research have found that consumers' preferences and perceived degree of abnormality rely on the type of product in question (Loebnitz & Grunert, 2015; Hooge et al., 2017). The study should therefore be replicated and tested for the same measures on other fruits and vegetables. This would be to see if the same imperfections on other types of fruits and vegetables will elicit different emotional reactions, attitudes, and willingness to purchase. However, as previous research have found that consumers tend to avoid product imperfections in general, this indicates that the results,

although solely based on apples, are still contributing with useful insight in regard to the consumers' emotional responses towards various imperfections. Additionally, the results indicate what kind of imperfections are perceived to be the worst and least desirable.

Regarding the questionnaire design, a possible limitation might involve language barriers. As the study was formulated in English, some of the Italians, Norwegians, and/or French participants might have experienced language barriers that could have influenced their understanding of the questions, and thereby affected their answers and the study results. However, as the study was pre-tested beforehand, with no feedback regarding language barriers, this effect is most likely rather low. Furthermore, the study did not consider age differences in the analyzes, although this previously have been found to affect consumers' food wasting behaviors. Moreover, the majority of the sample consisted of people in their twenties, meaning that the participants in the study included a young group of people. They might react differently when exposed to imperfections, as opposed to older people. Previous research has in fact shown that choice of suboptimal foods is greater among the younger age range (de Hooge et al., 2017), indicating that this young sample is not diversified enough to generalize the results across all ages. Future research studies might therefore take this demographic variable into consideration. Either by comparing different age groups, or at least making sure that the age is evenly distributed across the participant sample, in order to generalize the results.

As a limitation, it also should be mentioned that the study was conducted as an online experimental survey, which involves hypothetical choices. The design choices might therefore impact the results. However, the images of the products that were shown illustrated real apples with real imperfections, which could make the experiment results more relatable to an actual purchase situation. Additionally, no brands were used, which would induce greater attention to be paid to the actual studied factor. On the contrary, consumers in a store situation might by affected by other factors such as brands, prices, discounts and so on. In the current study, simply the emotional and attitudinal reactions of consumers being exposed to the apples were tested, which is an aid in figuring out what exact emotions each imperfection is evoking.

Finally, the current study was intended to gather insight and new understanding of consumers' food wasting behavior regarding imperfect fruit and vegetables, and further figure out how to possibly alter consumers purchasing behavior to include imperfect products. The findings provide important knowledge for researchers to use when evaluating effective intervention

strategies that will contradict consumers believes of risk and evoked feelings of disgust based on imperfections. The results therefore include the groundwork for researchers desiring to create communication messages and possibly campaigns that will teach consumers that these products are both edible and safe. This could contribute to remove the negative emotions and attitudes consumers currently feels towards the least desired imperfections, including crushed and rotten imperfections. Future research studies are therefore encouraged to evaluate and test for different communication messages and campaigns, based on the emotions and attitudes found to effect consumers' rejection of imperfect products. The aim should be to change their perceptions, attitude, and eventually purchasing behavior.

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7.0 Appendices

Appendix 1: Literature review summary (excel file)

Summarizing literature

Appendix 2a: Online questionnaire (bruised condition)

Please, rate the extent to which you feel the following emotions when looking at the picture of the apple.

	Not at all 1	2	3	4	5	6	Very much 7
Revulsion	○	○	○	○	○	○	○
Aversion	○	○	○	○	○	○	○
Disgust	○	○	○	○	○	○	○

→

Please, look at the picture of the apple and rate the extent to which you feel:

	Not at all 1	2	3	4	5	6	Very much 7
Threatened	○	○	○	○	○	○	○
Scared	○	○	○	○	○	○	○

→

Please, rate the extent to which you feel the following emotions when looking at the picture of the apple.

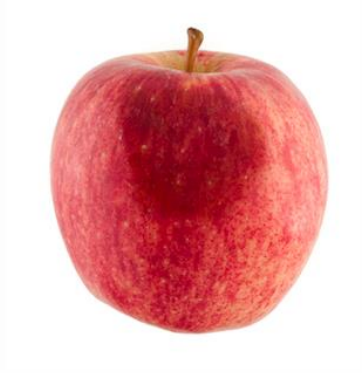
	Not at all 1	2	3	4	5	6	Very much 7
Suspicion	○	○	○	○	○	○	○
Skepticism	○	○	○	○	○	○	○
Uncertainty	○	○	○	○	○	○	○

→

Please, look at the picture of the apple and rate the extent to which you feel:

	Not at all 1	2	3	4	5	6	Very much 7
Sad	○	○	○	○	○	○	○
Discouraged	○	○	○	○	○	○	○

→



Please, rate the extent to which you feel the following emotions when looking at the picture of the apple shown above.

	Not at all 1	2	3	4	5	6	Very much 7
Contempt	○	○	○	○	○	○	○
Scorn	○	○	○	○	○	○	○
Disdain	○	○	○	○	○	○	○

→

Please, look at the picture of the apple and rate the extent to which you feel:

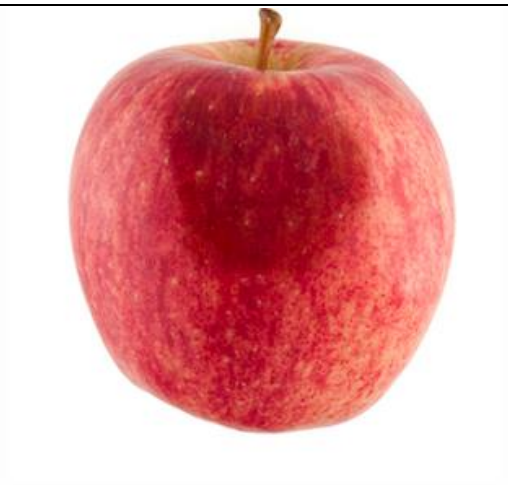
	Not at all 1	2	3	4	5	6	Very much 7
Mad	○	○	○	○	○	○	○
Angry	○	○	○	○	○	○	○
Annoyed	○	○	○	○	○	○	○

→

Please, rate your attitude toward the apple shown above.

	1	2	3	4	5	6	7	
Dislike it very much	○	○	○	○	○	○	○	Like it very much
Unfavorable	○	○	○	○	○	○	○	Favorable
Negative	○	○	○	○	○	○	○	Positive
Bad	○	○	○	○	○	○	○	Good
Undesirable	○	○	○	○	○	○	○	Desirable

→



Please, rate the apple shown above on the basis of the following attributes:

	1	2	3	4	5	6	7	
Not attractive	○	○	○	○	○	○	○	Attractive
Not appealing	○	○	○	○	○	○	○	Appealing
Not appetizing	○	○	○	○	○	○	○	Appetizing
Low quality	○	○	○	○	○	○	○	High quality
Substandard	○	○	○	○	○	○	○	Standard
Unacceptable	○	○	○	○	○	○	○	Acceptable
Unpleasant taste	○	○	○	○	○	○	○	Pleasant taste
Not fresh	○	○	○	○	○	○	○	Fresh
Not natural	○	○	○	○	○	○	○	Natural
Undesirable	○	○	○	○	○	○	○	Desirable

Please, rate your likelihood of buying the apple shown above:

	1	2	3	4	5	6	7	
Very unlikely to buy	○	○	○	○	○	○	○	Very likely to buy
Very unwilling to buy	○	○	○	○	○	○	○	Very willing to buy
Very uninclined to buy	○	○	○	○	○	○	○	Very inclined to buy

→

Please, rate the extent to which you agree with the following statements about the apple shown above:

	Not at all 1	2	3	4	5	6	Very much 7
It is an apple I would buy	○	○	○	○	○	○	○
It is a better option than other apples	○	○	○	○	○	○	○
It is inviting to eat	○	○	○	○	○	○	○
It is an apple I would choose and be happy to eat	○	○	○	○	○	○	○
It is an apple I would probably buy	○	○	○	○	○	○	○
It is still perfectly fine for sale in grocery stores	○	○	○	○	○	○	○

Please, rate the extent to which you think the apple shown above is:

	Not at all 1	2	3	4	5	6	Very much 7
Unsafe	○	○	○	○	○	○	○
Dangerous	○	○	○	○	○	○	○
Likely to make you sick	○	○	○	○	○	○	○
Harmful	○	○	○	○	○	○	○

→

Please, rate the extent to which you think the apple shown above is:

	Not at all 1	2	3	4	5	6	Very much 7
Abnormal	○	○	○	○	○	○	○
Wrong	○	○	○	○	○	○	○
Tainted	○	○	○	○	○	○	○
Improper	○	○	○	○	○	○	○

→

Please, choose TRUE or FALSE for every statement.

	FALSE	TRUE
I might be willing to try eating monkey meat, under some circumstances	○	○
It would bother me to see a rat run across my path in a park	○	○
Seeing a cockroach in someone else's house doesn't bother me	○	○
It bothers me to hear someone clear a throat full of mucus	○	○
If I see someone vomit, it makes me sick to my stomach	○	○
It would bother me to be in a science class, and see a human hand preserved in a jar	○	○
It would not upset me at all to watch a person with a glass eye take the eye out of the socket	○	○

→

Please, choose TRUE or FALSE for every statement.

	FALSE	TRUE
It would bother me tremendously to touch a dead body	○	○
I would go out of my way to avoid walking through a graveyard	○	○
I never let any part of my body touch the toilet seat in a public washroom	○	○
I probably would not go to my favorite restaurant if I found out that the cook had a cold	○	○
Even if I was hungry, I would not drink a bowl of my favorite soup if it had been stirred with a used but thoroughly washed flyswatter	○	○
It would bother me to sleep in a nice hotel room if I knew that a man had died of a heart attack in that room the night before	○	○

→

Please, rate how disgusting you would find the following experiences

	Not at all disgusting 1	Slightly disgusting 2	Very disgusting 3
If you see someone put ketchup on vanilla ice cream and eat it	○	○	○
You are about to drink a glass of milk when you smell that it is spoiled	○	○	○
You see maggots on a piece of meat in an outdoor garbage pail	○	○	○
You are walking barefoot on concrete and step on an earthworm	○	○	○
While you are walking through a tunnel under a railroad track, you smell urine	○	○	○
You see a man with his intestines exposed after an accident	○	○	○
Your friend's pet cat dies and you have to pick up the dead body with your bare hands	○	○	○
You accidentally touch the ashes of a person who has been cremated	○	○	○
You take a sip of soda and realize that you drank from the glass that an acquaintance of yours had been drinking from	○	○	○
You discover that a friend of yours changes underwear only once a week	○	○	○
A friend offers you a piece of chocolate shaped like dog-doo	○	○	○
As part of a sex education class, you are required to inflate a new lubricated condom, using your mouth	○	○	○

→

How often do you go grocery shopping for your household?

Never 1	Hardly ever 2	Seldom 3	Sometimes 4	Usually 5	Most often 6	Always 7
○	○	○	○	○	○	○

→

How often do you cook at home in a week?

Never 1	Hardly ever 2	Seldom 3	Sometimes 4	Usually 5	Most often 6	Always 7
○	○	○	○	○	○	○

→

Gender

○ Male

○ Female

Age

Please, write down your nationality.

Education

- ◯ Middle school degree
- ◯ High school degree
- ◯ Undergraduate degree
- ◯ Master's degree
- ◯ Phd
- ◯ Other

Occupation

- ◯ Student
- ◯ Freelance
- ◯ Employee
- ◯ Manager
- ◯ Other

Appendix 2b: Survey template (perfect condition)

Imperfection and disgust study

Start of Block: Default Question Block

Intro
Thanks for agreeing to take part in this brief survey.

There are no right or wrong answers, we are just interested in your opinion.
Responses will be anonymous.

Thanks again for your help.

End of Block: Default Question Block

Start of Block: Perfect

Intro
Now you will be shown a picture.
Please, take some time and look at it carefully. Later, you will be asked some questions about the product shown in the picture.

Page Break

Perfect

Page Break

Disgust

Please, rate the extent to which you feel the following emotions when looking at the picture of the apple.

	Not at all 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Very much 7 (7)
Revulsion (1)	○	○	○	○	○	○	○
Aversion (2)	○	○	○	○	○	○	○
Disgust (3)	○	○	○	○	○	○	○

Page Break

Contempt

Please, rate the extent to which you feel the following emotions when looking at the picture of the apple shown above.

	Not at all 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Very much 7 (7)
Contempt (1)	○	○	○	○	○	○	○
Scorn (2)	○	○	○	○	○	○	○
Disdain (3)	○	○	○	○	○	○	○

Page Break

Uncertainty

Please, rate the extent to which you feel the following emotions when looking at the picture of the apple.

	Not at all 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Very much 7 (7)
Suspicion (1)	○	○	○	○	○	○	○
Skepticism (2)	○	○	○	○	○	○	○
Uncertainty (3)	○	○	○	○	○	○	○

Page Break

Anger

Please, look at the picture of the apple and rate the extent to which you feel:

	Not at all 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Very much 7 (7)
Mad (1)	○	○	○	○	○	○	○
Angry (2)	○	○	○	○	○	○	○
Annoyed (3)	○	○	○	○	○	○	○

Page Break

Fear

Please, look at the picture of the apple and rate the extent to which you feel:

	Not at all 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Very much 7 (7)
Threatened (1)	○	○	○	○	○	○	○
Scared (2)	○	○	○	○	○	○	○

Page Break

Sadness

Please, look at the picture of the apple and rate the extent to which you feel:

	Not at all 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Very much 7 (7)
Sad (1)	○	○	○	○	○	○	○
Discouraged (2)	○	○	○	○	○	○	○

Page Break

Attitude

Please, rate your attitude toward the apple shown above.

	1	2	3	4	5	6	7	
	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	
Dislike it very much	○	○	○	○	○	○	○	Like it very much
Unfavorable	○	○	○	○	○	○	○	Favorable
Negative	○	○	○	○	○	○	○	Positive
Bad	○	○	○	○	○	○	○	Good
Undesirable	○	○	○	○	○	○	○	Desirable

Page Break

Attitude_2

Please, rate the apple shown above on the basis of the following attributes:

	1	2	3	4	5	6	7	
	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	
Not attractive	○	○	○	○	○	○	○	Attractive
Not appealing	○	○	○	○	○	○	○	Appealing
Not appetizing	○	○	○	○	○	○	○	Appetizing
Low quality	○	○	○	○	○	○	○	High quality
Substandard	○	○	○	○	○	○	○	Standard
Unacceptable	○	○	○	○	○	○	○	Acceptable
Unpleasant taste	○	○	○	○	○	○	○	Pleasant taste
Not fresh	○	○	○	○	○	○	○	Fresh
Not natural	○	○	○	○	○	○	○	Natural
Undesirable	○	○	○	○	○	○	○	Desirable

Page Break

Purchase intention

Please, rate your likelihood of buying the apple shown above:

	1	2	3	4	5	6	7	
	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	
Very unlikely to buy	○	○	○	○	○	○	○	Very likely to buy
Very unwilling to buy	○	○	○	○	○	○	○	Very willing to buy
Very uninclined to buy	○	○	○	○	○	○	○	Very inclined to buy

Page Break

Intention to consume

Please, rate the extent to which you agree with the following statements about the apple shown above:

	Not at all 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Very much 7 (7)
It is an apple I would buy (1)	○	○	○	○	○	○	○
It is a better option than other apples (2)	○	○	○	○	○	○	○
It is inviting to eat (3)	○	○	○	○	○	○	○
It is an apple I would choose and be happy to eat (4)	○	○	○	○	○	○	○
It is an apple I would probably buy (5)	○	○	○	○	○	○	○
It is still perfectly fine for sale in grocery stores (6)	○	○	○	○	○	○	○

Page Break

Safety concerns

Please, rate the extent to which you think the apple shown above is:

	Not at all 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Very much 7 (7)
Unsafe (1)	○	○	○	○	○	○	○
Dangerous (2)	○	○	○	○	○	○	○
Likely to make you sick (3)	○	○	○	○	○	○	○
Harmful (4)	○	○	○	○	○	○	○

Page Break

Abnormality

Please, rate the extent to which you think the apple shown above is:

	Not at all 1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	Very much 7 (7)
Abnormal (1)	○	○	○	○	○	○	○
Wrong (2)	○	○	○	○	○	○	○
Tainted (3)	○	○	○	○	○	○	○
Improper (4)	○	○	○	○	○	○	○

Page Break

Intro_ind
Now you will be asked some questions about yourself.
Please, read the statements carefully and answer to the questions.

Page Break

DS_1
Please, choose TRUE or FALSE for every statement.

	FALSE (1)	TRUE (2)
I might be willing to try eating monkey meat, under some circumstances (1)	○	○
It would bother me to see a rat run across my path in a park (2)	○	○
Seeing a cockroach in someone else's house doesn't bother me (3)	○	○
It bothers me to hear someone clear a throat full of mucus (4)	○	○
If I see someone vomit, it makes me sick to my stomach (5)	○	○
It would bother me to be in a science class, and see a human hand preserved in a jar (6)	○	○
It would not upset me at all to watch a person with a glass eye take the eye out of the socket (7)	○	○

Page Break

DS_1(2)
Please, choose TRUE or FALSE for every statement.

	FALSE (1)	TRUE (2)
It would bother me tremendously to touch a dead body (8)	○	○
I would go out of my way to avoid walking through a graveyard (9)	○	○
I never let any part of my body touch the toilet seat in a public washroom (10)	○	○
I probably would not go to my favorite restaurant if I found out that the cook had a cold (11)	○	○
Even if I was hungry, I would not drink a bowl of my favorite soup if it had been stirred with a used but thoroughly washed flyswatter (12)	○	○
It would bother me to sleep in a nice hotel room if I knew that a man had died of a heart attack in that room the night before (13)	○	○

Page Break

DS_2
Please, rate how disgusting you would find the following experiences

	Not at all disgusting 1 (1)	Slightly disgusting 2 (2)	Very disgusting 3 (3)
If you see someone put ketchup on vanilla ice cream and eat it (1)	○	○	○
You are about to drink a glass of milk when you smell that it is spoiled (2)	○	○	○
You see maggots on a piece of meat in an outdoor garbage pail (3)	○	○	○
You are walking barefoot on concrete and step on an earthworm (4)	○	○	○
While you are walking through a tunnel under a railroad track, you smell urine (5)	○	○	○
You see a man with his intestines exposed after an accident (6)	○	○	○
Your friend's pet cat dies and you have to pick up the dead body with your bare hands (7)	○	○	○
You accidentally touch the ashes of a person who has been cremated (8)	○	○	○
You take a sip of soda and realize that you drank from the glass that an acquaintance of yours had been drinking from (9)	○	○	○
You discover that a friend of yours changes underwear only once a week (10)	○	○	○

A friend offers you a piece of chocolate shaped like dog-doo (11)	○	○	○
As part of a sex education class, you are required to inflate a new lubricated condom, using your mouth (12)	○	○	○

End of Block: Perfect

Start of Block: Habits grocery

Habits Grocery How often do you go grocery shopping for your household?

- ○ Never 1 (1)
- ○ Hardly ever 2 (2)
- ○ Seldom 3 (3)
- ○ Sometimes 4 (4)
- ○ Usually 5 (5)
- ○ Most often 6 (6)
- ○ Always 7 (8)

Page Break

Cooking How often do you cook at home in a week?

- ○ Never 1 (1)
- ○ Hardly ever 2 (2)
- ○ Seldom 3 (3)
- ○ Sometimes 4 (4)
- ○ Usually 5 (5)
- ○ Most often 6 (6)
- ○ Always 7 (8)

End of Block: Habits grocery

Start of Block: Socio-demo

Gender Gender

- ○ Male (1)
- ○ Female (2)

Age Age

_____

Nationality Please, write down your nationality.

_____

Education Education

- ○ Middle school degree (1)
- ○ High school degree (2)
- ○ Undergraduate degree (3)
- ○ Master's degree (4)
- ○ Phd (5)
- ○ Other (6)

Occupation Occupation

- ○ Student (1)
- ○ Freelance (2)
- ○ Employee (3)
- ○ Manager (4)
- ○ Other (5)

End of Block: Socio-demo

Appendix 3: Images of the eight apple conditions

Condition 1: Perfect

Condition 2: Bruised

Condition 3: Color spots

Condition 4: Crushed_1

Condition 5: Crushed 2

Condition 6: Misshaped

Condition 7: Rotten 1

Condition 8: Rotten 2

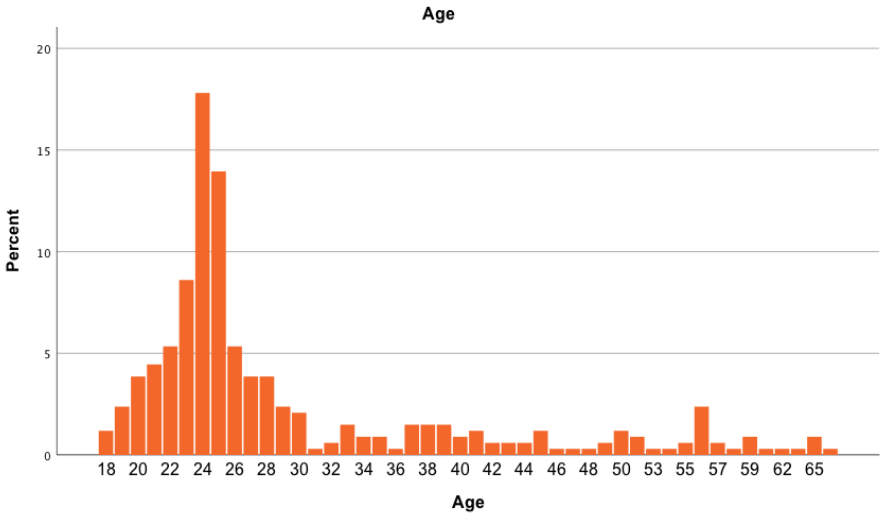
Appendix 4: Descriptive statistics tables

4.1 Gender distribution:

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	150	44,5	44,5	44,5
	Female	187	55,5	55,5	100,0
	Total	337	100,0	100,0	

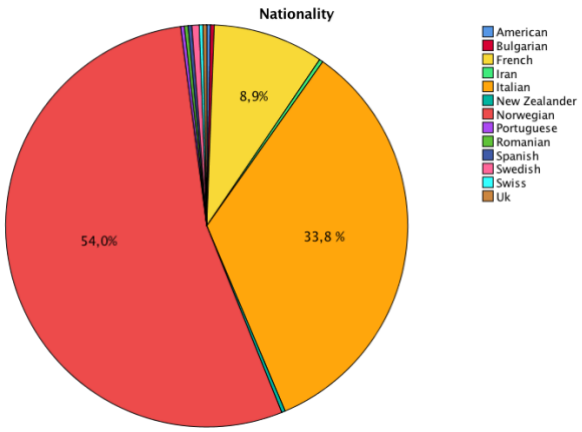
4.2 Age distribution:



4.3 Nationality descriptives:

Nationality

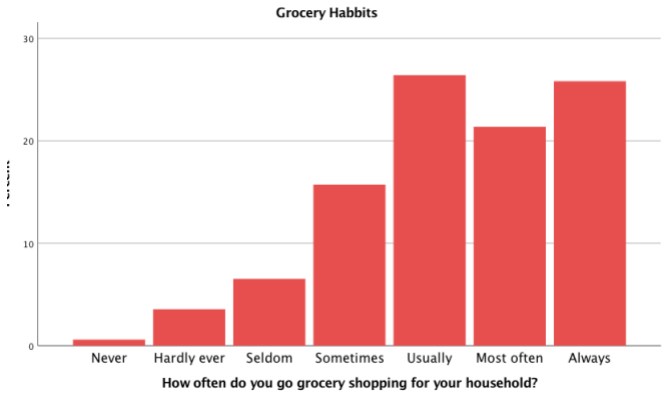
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	American	1	,3	,3	,3
	Bulgarian	1	,3	,3	,6
	French	30	8,9	8,9	9,5
	Iran	1	,3	,3	9,8
	Italian	114	33,8	33,8	43,6
	New Zealander	1	,3	,3	43,9
	Norwegian	182	54,0	54,0	97,9
	Portuguese	1	,3	,3	98,2
	Romanian	1	,3	,3	98,5
	Spanish	1	,3	,3	98,8
	Swedish	2	,6	,6	99,4
	Swiss	1	,3	,3	99,7
	Uk	1	,3	,3	100,0
	Total	337	100,0	100,0	



4.4 Grocery and cooking habits:

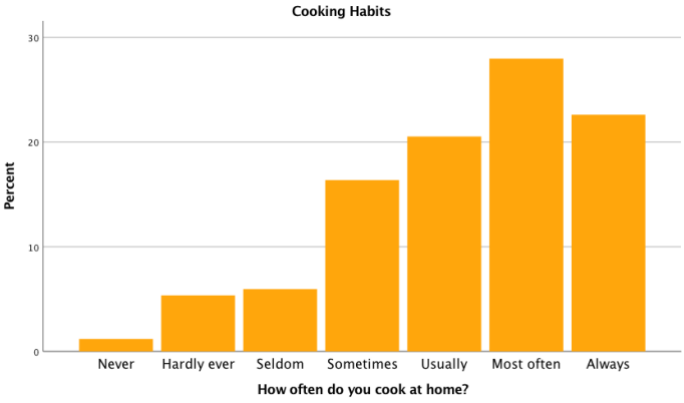
How often do you go grocery shopping for your household?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	2	,6	,6	,6
	Hardly ever	12	3,6	3,6	4,2
	Seldom	22	6,5	6,5	10,7
	Sometimes	53	15,7	15,7	26,4
	Usually	89	26,4	26,4	52,8
	Most often	72	21,4	21,4	74,2
	Always	87	25,8	25,8	100,0
	Total	337	100,0	100,0	



How often do you cook at home?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	4	1,2	1,2	1,2
	Hardly ever	18	5,3	5,3	6,5
	Seldom	20	5,9	5,9	12,5
	Sometimes	55	16,3	16,3	28,8
	Usually	70	20,8	20,8	49,6
	Most often	94	27,9	27,9	77,4
	Always	76	22,6	22,6	100,0
	Total	337	100,0	100,0	



Appendix 5: One-Way ANOVA results for abnormality

Mean comparison based on measures for abnormality:

Abnormality

Condition		Abnormal	Wrong	Tainted	Improper
perfect	Mean	1,30	1,28	1,43	1,22
	N	46	46	46	46
	Std. Deviation	,662	,750	,958	,513
bruised	Mean	1,82	1,82	2,31	2,13
	N	39	39	39	39
	Std. Deviation	1,048	1,275	1,559	1,490
color	Mean	1,78	1,50	1,85	1,72
	N	40	40	40	40
	Std. Deviation	1,310	,934	1,312	1,176
crushed_1	Mean	3,03	2,92	3,00	3,45
	N	40	40	40	40
	Std. Deviation	1,656	1,745	1,935	1,921
crushed_2	Mean	2,24	2,17	2,57	2,35
	N	46	46	46	46
	Std. Deviation	1,448	1,322	1,669	1,386
misshapen	Mean	1,81	1,64	1,74	1,86
	N	42	42	42	42
	Std. Deviation	1,174	1,122	1,106	1,299
rotten_1	Mean	2,42	2,93	3,21	3,14
	N	43	43	43	43
	Std. Deviation	1,562	1,751	1,740	1,910
rotten_2	Mean	2,83	2,73	3,02	3,24
	N	41	41	41	41
	Std. Deviation	1,815	1,761	1,710	1,800
Total	Mean	2,14	2,12	2,38	2,37
	N	337	337	337	337
	Std. Deviation	1,465	1,497	1,636	1,661

Average mean and std. deviation:

	N	Mean	Std.Deviation
Perfect	46	1,3098	0,5301
Bruised	39	2,0192	1,21041
Color	40	1,7125	0,96833
Crushed_1	40	3,1000	1,60308
Crushed_2	46	2,3315	1,16792
Misshapen	42	1,7619	1,11113
Rotten_1	43	2,9244	1,50548
Rotten_2	41	2,9573	1,59580
Total	337	2,2545	1,38846

ANOVA table for homogeneous subsets based on average mean:

Homogeneous Subsets

Average abnormality perception

			Subset for alpha = 0.05		
	Condition	N	1	2	3
Tukey HSD[a,b]	perfect	46	1,3098		
	color	40	1,7125	1,7125	
	misshapen	42	1,7619	1,7619	
	bruised	39	2,0192	2,0192	
	crushed_2	46		2,3315	2,3315
	rotten_1	43			2,9244
	rotten_2	41			2,9573
	crushed_1	40			3,1000
	Sig.		,160	,314	,094

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 41,978.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Appendix 6: One-Way ANOVA results for purchase intention

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Very unlikely to buy / Very likely to buy	perfect	46	4,33	2,261	0,333	3,65	5,00	1	7
	bruised	39	3,59	2,022	0,324	2,93	4,25	1	7
	color	40	2,93	1,639	0,259	2,40	3,45	1	7
	crushed_1	40	2,03	1,368	0,216	1,59	2,46	1	6
	crushed_2	46	2,63	1,451	0,214	2,20	3,06	1	7
	misshapen	42	4,45	1,770	0,273	3,90	5,00	1	7
	rotten_1	43	1,56	1,098	0,167	1,22	1,90	1	7
	rotten_2	41	2,24	1,814	0,283	1,67	2,82	1	7
	Total	337	2,98	1,974	0,108	2,77	3,19	1	7
Very unwilling to buy / Very willing to buy	perfect	46	4,17	2,350	0,347	3,48	4,87	1	7
	bruised	39	3,49	1,805	0,289	2,90	4,07	1	7
	color	40	2,98	1,687	0,267	2,44	3,51	1	7
	crushed_1	40	2,18	1,483	0,234	1,70	2,65	1	6
	crushed_2	46	2,76	1,463	0,216	2,33	3,20	1	7
	misshapen	42	4,31	1,585	0,245	3,82	4,80	1	7
	rotten_1	43	1,56	1,053	0,161	1,23	1,88	1	7
	rotten_2	41	2,24	1,714	0,268	1,70	2,79	1	7
	Total	337	2,97	1,905	0,104	2,77	3,17	1	7
Very uninclined to buy / Very inclined to buy	perfect	46	3,96	2,270	0,335	3,28	4,63	1	7
	bruised	39	3,72	1,806	0,289	3,13	4,30	1	7
	color	40	2,88	1,620	0,256	2,36	3,39	1	7
	crushed_1	40	1,98	1,209	0,191	1,59	2,36	1	4
	crushed_2	46	2,76	1,523	0,225	2,31	3,21	1	7
	misshapen	42	4,07	1,731	0,267	3,53	4,61	1	7
	rotten_1	43	1,63	1,155	0,176	1,27	1,98	1	7
	rotten_2	41	2,17	1,702	0,266	1,63	2,71	1	7
	Total	337	2,90	1,871	0,102	2,70	3,10	1	7

ANOVA table for homogeneous subsets based on average mean:

Homogeneous Subsets

Average Purchase Intention

			Subset for alpha = 0.05			
	Condition	N	1	2	3	4
Tukey HSD[a,b]	rotten_1	43	1,5814			
	crushed_1	40	2,0583	2,0583		
	rotten_2	41	2,2195	2,2195		
	crushed_2	46		2,7174	2,7174	
	color	40		2,9250	2,9250	
	bruised	39			3,5983	3,5983
	perfect	46				4,1522
	misshapen	42				4,2778
	Sig.		,617	,220	,202	,536

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 41,978.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Appendix 7: One-Way ANOVA results for safety concerns

Mean comparison based on measures for safety concerns:

Safety Concerns

Condition		Unsafe	Dangerous	Likely to make you sick	Harmful
perfect	Mean	1,61	1,22	1,46	1,39
	N	46	46	46	46
	Std. Deviation	1,256	,593	1,005	,930
bruised	Mean	1,92	1,56	1,90	1,64
	N	39	39	39	39
	Std. Deviation	1,494	,995	1,586	1,203
color	Mean	1,65	1,25	1,43	1,30
	N	40	40	40	40
	Std. Deviation	1,331	,707	,781	,648
crushed_1	Mean	2,70	2,43	2,82	2,55
	N	40	40	40	40
	Std. Deviation	1,698	1,534	1,752	1,663
crushed_2	Mean	2,33	1,74	1,80	1,89
	N	46	46	46	46
	Std. Deviation	1,814	1,219	1,108	1,320
misshapen	Mean	1,86	1,60	1,52	1,60
	N	42	42	42	42
	Std. Deviation	1,617	1,149	1,153	1,149
rotten_1	Mean	2,67	2,09	2,72	2,47
	N	43	43	43	43
	Std. Deviation	1,672	1,360	1,709	1,653
rotten_2	Mean	2,88	2,59	2,88	2,68
	N	41	41	41	41
	Std. Deviation	1,873	1,789	1,778	1,836
Total	Mean	2,20	1,80	2,06	1,93
	N	337	337	337	337
	Std. Deviation	1,660	1,300	1,506	1,432

ANOVA table for homogeneous subsets based on average mean:

Homogeneous Subsets

Average abnormality perception

	Condition	N	Subset for alpha = 0.05		
			1	2	3
Tukey HSD[a,b]	perfect	46	1,3098		
	color	40	1,7125	1,7125	
	misshapen	42	1,7619	1,7619	
	bruised	39	2,0192	2,0192	
	crushed_2	46		2,3315	2,3315
	rotten_1	43			2,9244
	rotten_2	41			2,9573
	crushed_1	40			3,1000
	Sig.		,160	,314	,094

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 41,978.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Appendix 8: MANOVA for emotional reactions towards conditions

Average emotional reactions for the different conditions:

Condition		Mean	Std. Deviation	N
Avg. Disgust score	perfect	1,2754	0,73133	46
	bruised	2,4103	1,43772	39
	color	2,1000	1,22463	40
	crushed_1	2,7750	1,42102	40
	crushed_2	2,2681	1,37099	46
	misshapen	1,5794	1,02293	42
	rotten_1	3,9457	1,69333	43
	rotten_2	4,2114	1,54696	41
	Total	2,5539	1,64504	337
Avg. Contempt score	perfect	1,5942	1,30887	46
	bruised	1,9487	1,07480	39
	color	2,0500	1,12862	40
	crushed_1	2,4750	1,40793	40
	crushed_2	2,3043	1,29924	46
	misshapen	1,9762	1,26318	42
	rotten_1	2,8682	1,91367	43
	rotten_2	3,4959	1,54762	41
	Total	2,3323	1,49104	337
Avg. Uncertainty score	perfect	1,9348	1,40654	46
	bruised	2,9060	1,82245	39
	color	2,4083	1,32795	40
	crushed_1	3,5000	1,70636	40
	crushed_2	2,7029	1,60128	46
	misshapen	2,2222	1,31629	42
	rotten_1	3,3023	1,67587	43
	rotten_2	3,6992	1,75247	41
	Total	2,8190	1,67593	337
Avg. Anger score	perfect	1,3406	0,75192	46
	bruised	1,9658	1,05074	39
	color	1,5750	0,96664	40
	crushed_1	2,3583	1,29735	40
	crushed_2	1,8913	1,27086	46
	misshapen	1,4206	0,88363	42
	rotten_1	1,9767	1,10888	43
	rotten_2	2,5610	1,34668	41
	Total	1,8764	1,16136	337
Avg. Fear score	perfect	1,2935	0,94031	46
	bruised	1,6410	1,08184	39
	color	1,2250	0,58780	40
	crushed_1	1,4750	1,12061	40
	crushed_2	1,4674	0,86540	46
	misshapen	1,2262	0,63632	42
	rotten_1	1,6628	1,14809	43
	rotten_2	2,1707	1,57563	41
	Total	1,5163	1,06369	337
Avg. Sadness score	perfect	1,4457	1,14614	46

	bruised	2,1795	1,30024	39
	color	1,9875	1,31796	40
	crushed_1	2,2250	1,41399	40
	crushed_2	2,1848	1,36365	46
	misshapen	1,7381	1,25055	42
	rotten_1	2,4186	1,46357	43
	rotten_2	3,0244	1,68059	41
	Total	2,1409	1,42841	337

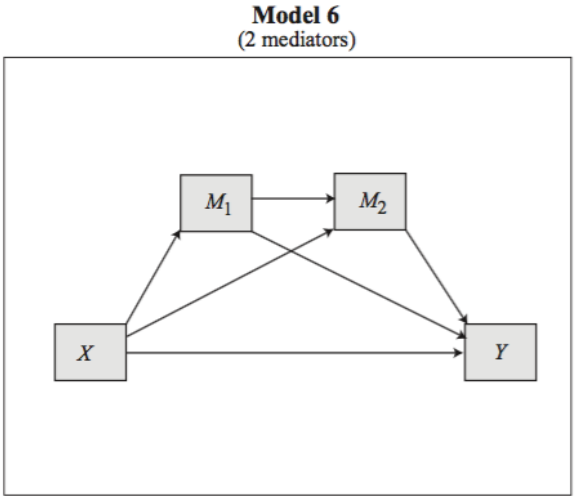
Appendix 9: MANOVA for attitudes based on various conditions

Average attitudes based on different conditions:

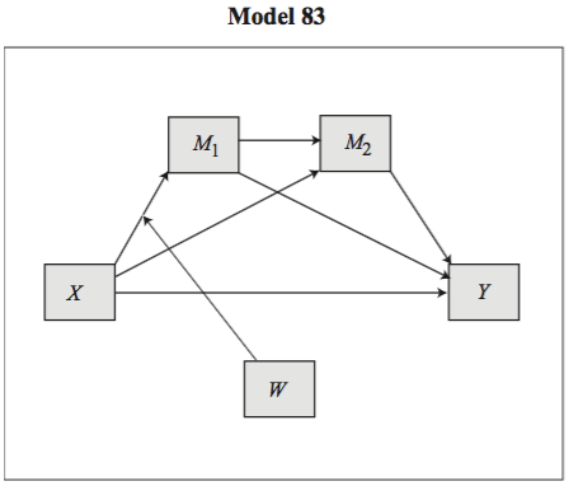
Condition		Mean	Std. Deviation	N
Avg. attitude towards apple	perfect	3,5565	2,33806	46
	bruised	3,7077	1,75550	39
	color	3,1200	1,48276	40
	crushed_1	2,8550	1,13408	40
	crushed_2	3,3130	1,13110	46
	misshapen	3,7476	1,78342	42
	rotten_1	2,5628	1,09219	43
	rotten_2	3,1024	1,51995	41
	Total	3,2475	1,61897	337
Avg. attribute rating of the apple	perfect	4,0283	2,15568	46
	bruised	3,9154	1,54639	39
	color	3,4475	1,19593	40
	crushed_1	3,0025	1,24581	40
	crushed_2	3,5848	1,00664	46
	misshapen	4,3262	1,49537	42
	rotten_1	2,6047	1,01065	43
	rotten_2	3,0829	1,35719	41
	Total	3,5045	1,51414	337

Appendix 10: Conceptual models from Andrew F. Hayes

Model 6 (double mediation)



Model 83 (moderation and double mediation)



8.0 Thesis Summary

Introduction

Food waste today constitute a major issue worldwide. Each year, the global food waste amounts to one third of all food produced for human consumption, involving a yearly waste of 1.3 billion (Gustavsson et al., 2011). The wasted amounts of food compose a critical issue both related to global food security and good environmental government (Stenmarck et al., 2016). Moreover, the severe amounts of food waste involve consequences beyond only the financial losses. These include the supplementary repercussions resulting in the waste of water, land, energy, labour and capital, as well as unnecessary produce of greenhouse gas emissions contributing to global warming and climate change (FAO, 2013). Furthermore, simultaneously as huge amounts of food are being wasted in many parts of the world, still a frightening number of 795 million people are suffering from severe hunger and malnutrition (Lyons, 2015). Food waste have therefore received an increased attention over the last few years, with its consequences currently being evaluated and attempted reduced through academic debates, civil society initiatives, and political agendas (Falasconi et al., 2015).

Effective strategies for a reduced food waste on a global level would thereby contribute in achieving sustainable development goals, such as supporting the fight against climate change, saved money for farmers, companies, and households, and, most importantly, saved nutrition food for redistribution to those in need. The latter would be an essential aid in eradicating hunger and malnutrition, and it would have a crucial impact on meeting the demand of global food needs. Efficient initiatives to prevent food waste will therefore have substantial impact on the global well-being.

As food waste is a function of several factors, such as cultural, personal, political, geographic, and economic forces (Pearson et al., 2013), an effective prevention strategy requires an identification of the elements that together result in the amounts of food wasted. Food waste is separated from food loss, as the latter involves lost or damaged food that is no longer suitable for human consumption, and are therefore thrown away before it reaches the end consumer (Lagorio et al., 2018). On the contrary, food waste is food originally produced for human consumption that are being discarded instead of consumed, and it includes food that is perfectly edible when thrown away (Thyberg & Tonjes, 2016). This research study is therefore focused

on food waste, as it is generated in higher quantities than food loss. Thus, since previous research have identified consumers as the single biggest contributor of the total volume of generated food waste (Griffin et al., 2009), this shows the necessity of understanding consumers' food wasting behavior to come up with efficient reduction plans.

In trying to understand the reasons for consumers' food wasting behavior, an imperative source significantly contributing to food waste has been identified as both retailers' and consumers' unwillingness to sell and buy "imperfect" products (Aschemann-Witzel et al., 2015; De Hooge et al., 2017). The waste of imperfect products comprise food that contribute to the largest amount of food waste today (Aschemann-Witzel et al., 2015). These imperfect, or suboptimal products, can be defined as edible products that are perceived as undesirable in comparison with similar products, and are therefore being wasted at the consumer level. This can be based on either of the two following reasons; the products are close to (or at) the best-before date, or they deviate visually or in other sensory perceptions from the perceived optimal products (Aschemann-Witzel et al., 2015). This research paper investigates product imperfections in terms of the latter, where imperfect products are usually being perceived as visually abnormal and substandard compared to visually optimal or normal products.

A continuously growing food waste issue concerns the fact that large quantities of food are being wasted at the retail and consumer level, due to quality standards that over-emphasize product appearance (FAO, 2013). Particularly for fruits and vegetables, a common practice in the retail sector have become to exclude the displaying of fresh food that do not conform to specific standards for visual appearance related to color and size (Loebnitz & Grunert, 2015). Over the years, supermarkets have indeed embraced such high cosmetic standards for fruit and vegetables that it is causing them to dismiss fruits with even marginal flaws or deformities (Kor et al., 2017). After years of this selective displaying of only perfect-looking vegetables, consumers now expect the fruit and vegetables in the shelfs to be visually perfect, otherwise they do not purchase it. These beauty standards are thereby considerably contributing to food waste, through both supply chain actors and consumers discarding food that does not look good enough. In Europe alone, over 50 million tonnes of edible fruit and vegetables are being wasted based on aesthetic reasons (Quinn, 2018). Thus, to achieve a reduction of food waste based on perfectly edible food, it requires both supermarkets and the consumers to start embracing the "ugliness" of the currently defined imperfect products, as opposed to rejecting it. Thus, it is crucial with and understanding of consumers' responses to the unattractive products in the

stores to possibly come up with effective, sustainable strategies for interventions that will change consumers' waste behavior (Grewal et al., 2019).

As a response to all the waste based on beauty standards, several initiatives have been implemented the recent years to embrace shape abnormalities in fruit and vegetables, both by supermarkets, grocery chains and small start-up businesses. Among others, various campaigns have been launched to increase consumers purchase intentions towards these suboptimal products, by changing their perceptions of the appearance of the products. However, still as much as 45 % of all food wasted today are fruit and vegetables (Lyons, 2015). This implies that more research is necessary to gain insight into consumers' rejecting behaviors of imperfect fruit and vegetables. Many research studies have therefore investigated consumers' food wasting behaviors related to suboptimal products. Some of the main barriers found to prevent consumers from reducing their wasteful behaviors by rejecting imperfect fruit and vegetables includes; 1) quality associations based on product appearance, 2) emotional reactions of disgust, 3) consumer habits, meal planning, and shopping routines, 4) subjective norms and perceived behavioral control, 5) self-identity, and 6) awareness of environmental consequences.

Theoretical framework

Quality associations is the most profound and directly related issue to food waste based on imperfect products, as it involves consumers' perceptions of the products' visual appearance as indicators of its' quality standards. Since consumers associate food imperfections with lower product quality, it makes them less willing to purchase these types of products (de Hooge et al., 2017; Loebnitz & Grunert, 2015). Previous research have also found that consumers' purchase intention depends on the perceived degree of the abnormality of the products (Loebnitz et al., 2015; Jaeger et al., 2016). Moreover, the appearance of fruit and vegetables have also been found to affect consumers' risk perception, where consumers' perceived risk is higher for an abnormally shaped vegetable compared to a normally shaped vegetable (Loebnitz & Grunert, 2018). Thus, as people regard food quality as a sufficient consideration for deciding whether to purchase or consume fruit and vegetables, this constitutes a coherent barrier to a reduced food waste by diminishing peoples' feelings of guilt when throwing out food, along with a lack motivation to reduce food waste (Graham-Rowe et al., 2014). This is because the quality consumers base their purchase decision on is likely biased by their associations of the outer appearance of fruits and vegetables and the quality of the products.

Based on consumers' associations between imperfections and low quality, another barrier related to altering consumers' rejecting behavior involves the emotional reactions elicited when exposed to imperfect fruits and vegetables. Because of the risk perceptions and avoidant behavior towards products with imperfections, an assumption is that emotions like disgust is salient and negatively affecting the consumers purchasing behaviors. This is based on how disgust is usually experienced as a feeling of revulsion, sometimes even followed by getting nauseous, along with a desire to avoid the disgust eliciting 'source' (Rozin et al., 2000). Additionally, Block et al. (2016) state that contagion is a powerful denominator in the food domain, inducing people to show strong aversions towards food that are deemed disgusting. Thus, according to White et al. (2016), consumers' desire for perfect-looking fruit and vegetables might even come from peoples' evolutionary instincts to protect themselves from objects that might pose a threat to health or safety. However, as for most biological traits, there should be varying degrees of the presence of the disgust trait for each individual (Oaten et al., 2009). According to Oaten et al. (2009), difference in disgust sensitivity have predictable consequences in which people with low disgust sensitivity may, among others, make less careful food choices, and have a greater number of sexual partners than people with higher disgust sensitivity. This is assumed to be transferred to emotional reactions elicited when exposed to imperfect products, and lead to different actions and intentions in terms of purchasing or consuming these products.

Furthermore, people usually rely on their previous shopping routines in purchase situations (Maubach et al., 2009), and they make purchase decisions based primarily on their habits (Farr-Wharton et al., 2014; Russell et al., 2017). This implies that altering peoples' behavior in terms of purchasing imperfect fruit and vegetables, requires an altogether change in their behavioral routines, along with a separation from their old habits (Stern, 2000). Hebrok and Boks (2017) also implies that it is imperative to figure out how to change current consumer food practices to reduce household food waste. Moreover, peoples' subjective norms and perceived behavioral control have also been found to affect consumer waste behavior. The latter involves whether consumers believe they have the ability to act in a way that does not amount to a lot of wasted food (Evans, 2012). Thus, another barrier related to minimising household food waste is found to be peoples' perception of the food waste responsibility as being of the food industry and supermarkets, rather than the individual (Graham-Rowe et al., 2014). This involves people disclaiming responsibility for their own actions, and thus also their perception of control in the matter.

Two final aspects found to influence consumers' unwillingness to purchase imperfect products, is their self-identity and their awareness of the environmental consequences. In terms of the peoples' self-identity it has been found that people tend to coordinate their self-identity with their behavior to avoid an internal dissonance (Loebnitz et al., 2015). Moreover, Grewal et al. (2019) state that consumers devalue unattractive produce because of altered self-perceptions, which explains why consumers are unwilling to purchase these products. It seems that simply imagining eating unattractive food negatively affects the way consumers see themselves, and therefore decrease their willingness to purchase, compared to equally safe but more attractive alternatives (Grewal et al., 2019). Furthermore, although there are some contradicting views on the topic, it has been found that people with higher problem awareness regarding environmental consequences of food waste express higher purchase intentions towards abnormally shaped food (Loebnitz et al., 2015). Therefore, an increased awareness of the food waste issues among consumers could encourage more consumers to purchase abnormally shaped fruits and vegetables (Loebnitz et al., 2015).

Contribution and research question

Most of the previous research studies on imperfect fruit and vegetables have mainly focused on imperfection in terms of shape-abnormalities (Loebnitz et al., 2015; Anschemann-Witzel et al., 2015; de Hooge et al., 2017; Grewal et al. 2019). Based on this, possible strategies for reduction have been found to be price discounts. However, as imperfections involve more than just shape abnormalities, this indicates that there is still a need for deeper insight in the fundamental elements of consumers' current decision making and behavior. Studies of other types of imperfections could lead to different results, and thereby require other types of interventions to influence consumers' willingness to purchase. This is crucial knowledge needed to effectively induce a long-term behavioral change strategy, with a focus on removing the current appearance standards for fruits and vegetables. Until now, only a few studies have looked at other types of abnormalities, such as color, bruises, and cuts. For example, it has been found that consumers' preferences rely on both the type of product (Loebnitz & Grunert, 2015; de Hooge et al., 2017), as well as the perceived severity of the abnormality/imperfection (Jaeger and Machín et al., 2018). Several researchers have therefore suggested future research to focus on different imperfections in fruits and vegetables, besides shape, to see how the various imperfections influence consumers' buying behaviors (Loebnitz & Grunert, 2015; de Hooge et al., 2017; Loebnitz & Grunert, 2018). It has also been suggested to investigate which imperfection criteria

are the most distinct and important to consumers in the purchase situation, as well as their emotional reactions towards the different imperfections (Loebnitz et al., 2015, de Hooge et al., 2017; Jaeger & Machín et al., 2018, de Hooge, van Dulm & van Trijp, 2018; Grewal et al., 2019). Each individual consumer's disgust sensitivity might also be of importance in their evaluation and decision making process when purchasing imperfect products.

Based on the previous research findings and the current gap in the literature, regarding emotional responses to the different imperfections in fruit and vegetables, this research papers seeks to address this knowledge gap. This involves investigating the reasoning behind consumers' decision making along with their emotional responses to the different types of imperfect fruits and vegetables, and find whether different individual traits and levels of disgust will influence the results. The main objective of the paper is summarized in the research question;

What emotional reactions are elicited by the different kinds of imperfections in fruit and vegetables, and how are they affecting consumers' rejecting behavior in the purchase situation? What are the most distinct and least desirable abnormalities?

Preferably, the final research outcome will provide supply chain actors, particularly retailers, with useful insight. The results could be valuable for retailers in evaluating the factors influencing consumer choices, and educating them in terms of how to display, price, and sell various imperfect products in a way that makes customers inclined to purchase them. Three subsequent hypotheses were also developed based on the research question and tested in the methodological study;

H1: Varying degrees of imperfections in products will evoke varying degrees of emotional reactions, with more severe imperfections leading to stronger negative emotions and decreased willingness to purchase.

H2: An imperfect, compared to a perfect, product will lead to a lower willingness to purchase through evoked emotions of disgust, leading to negative attitudes towards the product.

H3: Higher individual disgust sensitivity will lead to stronger evoked feelings of disgust, and thereby more negative attitudes, leading to a decreased willingness to purchase imperfect products.

Method & procedure

Based on the aim of the study an appropriate data collection technique involved a descriptive design implemented in the form of a quantitative analysis. This included a web-based experimental survey that was conducted and distributed through the online questionnaire service Qualtrics. After a pre-test of the survey of a sample of participants (n = 10), some small changes were made to avoid misunderstandings and unclear questions/statements, before the actual survey were distributed to eligible participants. The participants were collected through a mix of convenience and snowball-sampling, and the sample size of the original data collection ended up consisting of 404 respondents. However, after a clean-up in the dataset, 67 respondents were excluded based on uncomplete answers and considerable missing values. The final sample therefore included 337 respondents that were included in the data analysis. All data collected through the Qualtrics Survey Software were transferred to SPSS Statistics version 25, for further analysis. This was thereby the main software used for the data analysis, along with an additional tool from process macro version 3.

The experimental survey objective involved identifying consumers' emotional reactions and attitudes towards different imperfections in fruits and vegetables, and further evaluate whether disgust sensitivity as an individual trait would influence these reactions. From there, the goal was to see how these factors would affect consumers' willingness to purchase. Thereby, to explore consumers' visual attention and reaction to various degrees of imperfections, eight apples were used as eight different conditions, in which the apples varied in their degree of imperfection/abnormality. To make the visual experiment as realistic as possible, images of real apples with real and natural imperfections were used. The images used in the survey are included on the next page.

Participants were randomly assigned to one of the eight conditions, and were further asked about their emotional reactions and attitudes towards the apple they were exposed to, along with their purchase intention and willingness to consume. The participants also indicated their risk perception related to the apple, along with the extent to which they perceived the apple to be abnormal. Finally, the participants were exposed to a disgust scale measuring their disgust

sensitivity. The survey ended by asking participants about their grocery shopping and cooking habits, along with some demographic variables. Thus, the main survey measures used for further analysis were; emotional reaction, attitude, risk perception/safety concerns, perceived abnormality, willingness to purchase and consume, and disgust sensitivity. The latter was measured by including the originally developed 32-item Discust Scale by Haidt, McCauley and Rozin (1994), that was revised by Olatunji, Williams, Tolin, Abramowitz, Sawchuk, Lohr, and Elwood, (2007), and excluded of 7 items. The scale used in the survey thereby included the remaining 25 items from the original disgust scale.

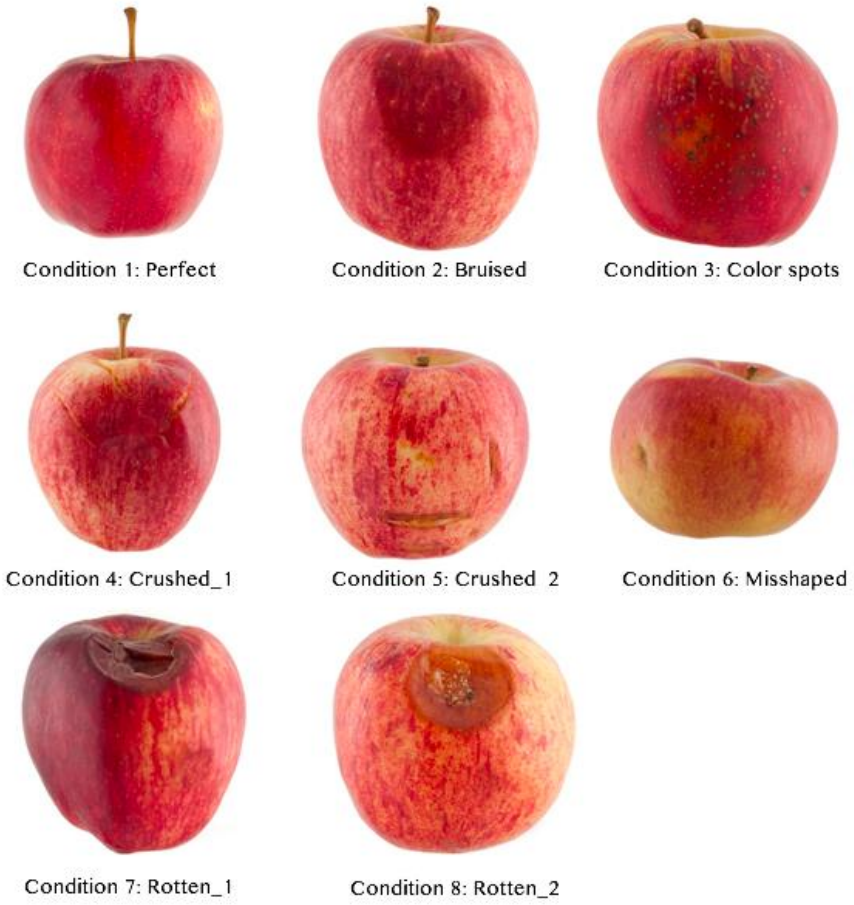


Fig.1: Images of the apple conditions used in the experimental survey

The sample consisted of 44.5% males and 55.5% females, ranging from 18 all the way to 71 years old. However, the majority of the participants were in their twenties, with 67% of them ranging from 20-29% years old (*mean* = 29.54, *SD* = 10.87). The geographic distribution of the participants includes mainly Norwegians (*n* = 182), Italians (*n* = 114) and French (*n* =30) participants. In terms of the participants' grocery habits, the majority answered that they

"usually" (*n* = 89), "most often" (*n* = 72), or "always" (*n* = 87) do the grocery shopping for their household. In total, these three answers constituted 73.5 % of the sample, leading to a left-skewed distribution. This was positive for the current study and the analyzes based on the purpose of the study, as most participants were regular grocery shoppers.

From the data analysis, it was first found that there were significant differences in the perception of abnormality based on the different imperfections. A mean comparison test showed that the three apple conditions perceived to be the most abnormal were; condition 4: 'crushed_1', condition 7: 'rotten_1', and condition 8: 'rotten_2'. In the following, it was found that the same three apples were also the ones that scored lowest on both willingness to consume and willingness to purchase. On the contrary, condition 1: 'perfect' and condition 6: 'misshapen' were the two with the highest scores for willingness to purchase and consume. These were also the ones perceived to be the least abnormal apples. Moreover, when testing consumers' safety concerns, it was found that this also varied significantly based on the various imperfections. This is presumed to be explained by the variation in the purchase and consumption intention, as the same apples that were perceived to be the most abnormal, and the least desired to purchase and consume, also scored highest on consumers' risk perception.

Further, analyzes of participants' emotional reactions were conducted to find which of the emotions were the most salient for the various imperfections. The results showed that condition 8: 'rotten_2" scored highest on all negative emotions (*disgust, contempt, uncertainty, anger, fear,* and *sadness*), followed by condition 7: 'rotten_1' and condition 4: 'crushed_1'. Moreover, the three emotional reactions with the highest mean score for the least desirable conditions were disgust, contempt, and uncertainty. Further, a Post Hoc tests also confirmed the distinction between the two "worst" and "best" conditions, by showing how the least desirable conditions scored significantly higher on the negative emotional reactions compared to the most desired conditions. Further findings confirmed that the least desirable apples also induced the most negative attitudes.

In the aftermath of the data analysis, two conceptual models developed by Andrew F. Hayes were implemented to test for possible mediation and moderation effects, and to be able to answer the research question and the hypotheses. The first

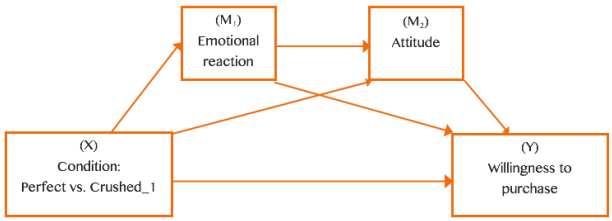


Fig.2: Model 6 with implemented variables

model was that was tested was number 6 from Hayes (2018) collection of conceptual models (illustrated to the right). The antecedent variable (independent variable) was the apple condition, including a perfect versus and imperfect apple, followed by emotional reaction of disgust as the first mediator, and attitude as a second mediator, and finally willingness to purchase as the consequent variable (dependent variable). For the antecedent variable, the two conditions compared were the perfect condition and the crushed_1 condition. The latter was chosen as the imperfect condition, as this was one of the most perceived abnormal and least desirable imperfections. It was chosen rather than the rotten conditions to make the scenario more realistic, seeing that in a purchase situation it is more likely to be faced with an imperfect apple equivalent to the crushed one, as opposed to the two rotten conditions.

The model includes a double mediation effect, in which the results would support or reject hypothesis 2. The mediation effect involves a serial rather that partial mediation, indicating that significant results would imply that consumers' emotional responses to an imperfect versus perfect apple condition, will further lead to changes in their attitudes, which eventually predicts their willingness to purchase.

The second model tested in the research paper was model 83, involving a combination of both the double mediation and a moderation effect, to see whether the third hypothesis would be confirmed. The moderator used was the total disgust sensitivity of the individual participants, that would possibly moderate the relationship between the condition and the emotional reaction of disgust. The aim was to see whether people with higher disgust sensitivity would elicit stronger feelings of disgust, leading to more negative attitudes, and eventually lower willingness to purchase.

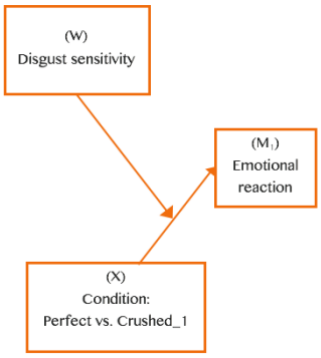


Fig.3: Illustrated moderation effect (model 83)

Brief presentation of the main findings

From the analyzation of the double mediation model (model 6), the findings reveal that there exists a serial mediation effect between emotional reaction and attitude. Moreover, there was a significant indirect effect of condition on consumers' willingness to purchase, in which the crushed_1 condition had a stronger effect on consumers' emotional reactions of disgust, leading to more negative attitudes, which again influenced their willingness to purchase. Thus, the results indicate that the emotional reaction of disgust is significantly stronger for the imperfect

apple, compared to the perfect, which induces more negative attitudes towards the apple, eventually significantly decreasing their willingness to purchase. These results confirm both hypothesis 1 and 2, in which a direct (main) effect on willingness to purchased based on condition is significant, as well as both a single mediation effect through emotional reaction, and a serial mediation effect through both emotional reaction and attitude is significant.

Furthermore, from the second model analyzation (model 83) including the moderation effect, there were no significant effects of the moderator on the relationship between condition and emotional reaction of disgust. The interaction effect, between the condition and disgust sensitivity on emotional reaction was thereby insignificant. This means that one cannot prove that the emotional reaction of disgust elicited when exposed to a perfect versus an imperfect apple is moderated by individuals' disgust sensitivity. This could be explained by the rather extreme measures used in the disgust sensitivity scale, which might not affect the emotional reaction triggered simply by imperfect fruit or vegetables. The effect would most like have been more significant for phenomena that are more consistent with the extreme statements described in the disgust scale. Regardless of how people vary in their levels of disgust sensitivity, the results do not provide sufficient evidence to suggest that individuals' disgust sensitivity do explain why certain people have more negative feeling of disgust towards the apple and therefore lower willingness purchase.

Through the various data analyzes conducted, the research question was answered. First, it was found that the emotional reactions that are elicited by imperfections in apples was strongest for disgust, contempt, and uncertainty. The remaining emotions included in the survey – sadness, fear, and anger – were also stronger for the least desired and most perceived abnormal apples than for the perfect and misshapen condition. For disgust, contempt, and uncertainty however, the negative emotion scores involved a clearer separation between the least and the most desired apples. Furthermore, the results from the conceptual models describe how these emotions are affecting consumers' behavior in terms of rejecting to purchase imperfect apples through a serial mediation effect. This involves the perfect versus an imperfect condition eliciting varying degrees of negative disgust emotions that influence consumers' attitudes and thereby their level of unwillingness to purchase. Moreover, the findings show that there are significant differences in the willingness to purchase an imperfect versus a perfect apple based on the salience of stronger feelings of disgust and thus more negative attitudes related to the apple's undesirability. The findings from the data analysis contribute in answering the last part of the

research question, where the crushed and rotten conditions are perceived to be both the most distinct abnormal and least desirable apples. The latter involves both in terms of willingness to purchase and willingness to consume. The research question is also answered more specifically through the three hypotheses, in which the table below provides a summary of the results.

Hypothesis	Conclusion
H1: *Varying degrees of imperfections in products will evoke varying degrees of emotional reactions, with more severe imperfections leading to stronger negative emotions and decreased willingness to purchase.*	Supported
H2: *An imperfect, compared to a perfect, product will lead to a lower willingness to purchase through evoked emotions of disgust, leading to negative attitudes towards the product.*	Supported
H3: *Higher individual disgust sensitivity will lead to stronger evoked feelings of disgust, and thereby more negative attitudes, leading to a decreased willingness to purchase imperfect products.*	Not supported

Discussion and implications

The study findings involve contributing information imperative for the research area regarding consumers' purchasing behavior related to imperfect fruit and vegetables. The results from the various analyzes conducted provide information regarding the negative emotions that are the most salient when consumers are being exposed to externally defected apples. These emotions also varied the most based on whether consumers were exposed to a perfect apple or an imperfect apple, and included disgust, contempt, and uncertainty. Moreover, the findings show which imperfections are perceived to be the worst by consumers, including the crushed and rotten apple imperfections. These findings add important and revealing information about consumers and the reasoning behind their rejecting behaviors.

The results further indicate that consumers are rejecting the imperfect apples because of feelings related to disease-avoidance, safety concerns, and fear of contagion, which are all symptoms associated with feelings of disgust. This also explains the elicited emotions of contempt and uncertainty, in which consumers do not even consider purchasing these products because of their uncertainty related to contamination and pathogen associations from the appearance of the apples. The unfamiliarity of the external looks of the apples are thus making consumers hesitant

and avoidant, which indicates that there is a lack of knowledge in terms of the edibleness of imperfect products among the consumers. The findings are thereby implying that consumers need to be more informed of the fact that an apple's appearance does not speak to its' safety and edibleness. The insight gained from the conducted survey conveys that both lack of exposure to these products, leading to unfamiliarity of the product appearance, along with uncertainty and skepticism, is leading consumers to reject imperfect products.

Moreover, the significant serial mediation effect shows that consumers' emotions are crucial in the process of inducing them to purchasing imperfect fruit and vegetables. This is based on how they further form consumers' attitudes and influencing their willingness to purchase. This implies that retailers need to act in a way that will create positive emotional responses for the consumers when they are exposed to varying degrees of imperfections in fruit and vegetables. Furthermore, since consumers are mainly avoiding purchasing these products because of disgust and contempt, including the fear of contagion and health concerns, retailers and other marketers will have to teach consumers that there is no harm in consuming imperfect products.

Furthermore, even the most perceived severe imperfections on the apples used in the study still involve only a small part of the apple being defected, indicating that consumers need to get aware of alternative uses for such products. For example, simply cutting off the rotten spot on the apple could be a solution, if consumers' thoughts of contamination and disgusted feelings are altered. Thereby, coherent with Jaeger and Antúnez et al.'s (2018) findings, the study results stress the need to make consumers aware that minor imperfections such as bruises, crushed parts and deviations in color and shape should not influence their willingness to accept apples that deviate from the current high visual quality standards.

As previous research have found price-discounts to induce consumers to purchase suboptimal products, primarily related to shape-abnormalities, this might be results of campaigns that have educated consumers on the harmlessness in eating weirdly shaped fruits. Additionally, it has contributed to consumers getting familiarized with the looks of abnormally shaped fruits by continuous exposure. Consumers have therefore become more familiar with weirdly shaped fruits, and do not perceive it as disgusting or risky to eat. In fact, the current study findings revealed that the misshapen condition was almost consistent with the perfect condition for all elicited emotions and attitudes. Additionally, the misshapen condition had similarly low degrees of risk perception among the consumers as the perfect condition. Furthermore, no

significant differences in consumers' willingness to purchase and/or consume were found between the shape-imperfection and the perfect condition. This confirms that consumers are today used to seeing various shape abnormalities, as well as they have learned that there is no harm in consuming these products. On the contrary, the three imperfections proved to be the least desirable in the study – crushed_1, rotten_1, and rotten_2 – are much more 'foreign' and unusual to the consumers. They are therefore perceived to be more abnormal and evoke stronger negative emotions and higher risk concerns than shape abnormalities. This emphasizes the importance of making consumers more used to seeing these types of imperfections, and further increase their knowledge regarding the safety of eating these products, regardless of their visual looks. It is thus necessary with intervention strategies that are based on the various emotions elicited by the different imperfections. By being aware of these emotional responses, an efficient intervention strategy should involve altering these perceptions and thereafter motivate people to purchase and consume these products.

Even though retailers and supply chain actors have previously been refraining from displaying imperfect food in their shelves, as they assume consumers will not be willing to purchase (de Hooge et al., 2018), this will be a necessary step to take to make consumers familiar with the imperfections and teach them that these products are perfectly edible. A huge responsibility is therefore upon the retailers, as their actions of displaying and marketing various products have significant influence on consumers' perceptions of the products. However, now that it is clearer exactly what emotional responses are evoked by the various imperfections, and how this is influencing consumers' willingness to purchase through induced attitudes, this can give retailers and supply chain actors an idea of how to communicate to shape attitudes and eventually consumers' purchase intention.

Finally, as the rejection of imperfect products is assumed to also be connected to peoples' self-image and -perception (Grewal et al., 2019), this is an aspect that needs to be influenced to design an intervention strategy that will induce consumers to purchase 'ugly' fruit and vegetables. As the findings show that misshapen apples are no longer perceived to be abnormal or risk threatening, but rather closely associated with perfect apples, retailers instead need to start focusing on the more severe imperfections. Such as with the campaigns for the shape-abnormalities in fruits and vegetables, marketing initiatives is required to be implemented for other imperfections, particularly the ones identified in the study as the least desirable. This could be an aid in eliminating the beauty standards of fruit and vegetables, which would

influence consumers' perceptions of imperfections in a positive way. A result could eventually involve that no abnormalities, in any form, would be associated with contagion and health concerns through elicited emotions of disgust. This way, consumers' self-perception would not be negatively impacted by purchasing these types of imperfect products. Finally, educational marketing campaigns could motivate consumers to purchase imperfect fruits and vegetables, as they would become aware of their own contribution in the reduction of a worldwide food waste by simply purchasing these products.

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