

**Leveraging “Guilt-free Pleasure” concept in developing healthful snack
products**

by

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B.S., Ocean University of China, China, 2008

M.S., Shanghai Ocean University, China, 2011

AN ABSTRACT OF A DISSERTATION

submitted in partial fulfillment of the
requirements for the degree

DOCTOR OF PHILOSOPHY

Department of Food, Nutrition, Dietetics and Health
College of Health and Human Sciences

KANSAS STATE UNIVERSITY
Manhattan, Kansas

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Abstract

Consumers are seeking greater healthy and ethical living globally nowadays. The goal of this dissertation is to gain insights on promoting healthy and sustainable eating behaviors through exploring the effect of guilt on food choice and eating behaviors.

In the first phase, consumer-based characteristics of food that might aid in identifying the different levels of guilt perceptions were investigated by using a qualitative approach. Product grouping patterns were identified with Sorting method based on different levels of guilt perceptions the consumers have had with 18 food and beverage products. Four categories of 45 factors were identified that could elicit guilt perceptions, including intrinsic product characteristics, extrinsic product characteristics, situational factors, and social-cultural factors, indicating its complexity and multidimensionality. Consumers' guilt tendency concerning food in the context of daily life was recognized as an essential characteristic that could influence consumers' food choices, eating behavior, purchase decisions, and lifestyle. Moreover, the product representation map implied the potential of using guilt related perceptions for product differentiation. White space of snack products that could deliver "Guilt-free pleasure" was identified, providing new opportunities for healthy snack products' development.

In the second phase, a Food Consumer Guilt Scale for measuring consumers' guilt tendencies to foods was developed. A preliminary questionnaire was constructed and validated in terms of the total scale score distribution, reliability, internal validity, and discriminating ability. The updated scale with 16 items was found to be a reliable measurement instrument that showed high internal consistency, discrimination power, and was cross-validated with a new sample of consumers. Factor analysis was conducted to uncover the underlying structure of the scale, which included three aspects: (1) consumers' eating behavior, including perceived unhealthiness of food and less unhealthy eating style; (2) the naturalness of the food and its

packaging; (3) a sustainable and healthy lifestyle. Consumers were identified with three different guilt tendencies related to food. They had diverse preference patterns and distinct potential eating frequency on products tested. These findings suggested that the Food Consumer Guilt Scale could be a useful segmentation tool to understand consumers' food choices and eating behaviors, therefore, helpful in providing guidance promoting healthy and sustainable eating behaviors.

In the third phase, a Food Product Guilt Scale was developed to measure how product characteristics affect on products' guilt perception. A preliminary questionnaire was constructed and tested through an online survey. Reliability, discriminating ability, and correlation with the product's guilt perception was evaluated to refine the items. A final 14-item measure was found to be a reliable measurement instrument possessing discrimination power and was cross-validated with a new sample of consumers. Moreover, it was found that there was no clear relationship between guilt rating and perceived liking of the products. Regretful, Irresponsible, Lazy, Unproductive, Bloated, Heavy, Gross and Terrible were identified positively related to guilt, whereas, Healthy, Natural, Good, Balanced, Energized, Refreshed, Energetic, Productive and Sustained were negatively correlated. Product representation showed that intrinsic product characteristics of nutritional values were the main contributors to tested products' guilt perception.

Keywords: Guilt, Scale development, Food choice, Product development, Consumer segmentation

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Preface

This research was inspired by a new snack product development program, which was carried out in 2018 in the Center of Sensory Analysis and Consumer Behavior. A team of 4 graduate students with three major background (Food Science, Grain Science and Sensory Science) participated in a three months fellowship following a 5-month product development class, under the supervision of KSU professors and top management team from an international food company. One of the projects was to develop a consumer desired vegetable snack.

The co-creating method was leveraged to ensure consumer expectations were incorporated through the whole product development process. With two veggie snacks formulated by different ratios of ingredients, two promising prototypes having different textures were produced: one very crispy, the other one more crunchy. Both prototypes received positive feedback when consumers tasted them. A unique phenomenon was observed: the first one was perceived as guilt-free, very natural, and the other was agreed as less guilt, a healthy alternative for snacking.

In the following up quantitative central location test, both prototypes were validated as high consumers acceptance obtained together with a high agreement (exceeding 90%) on the statement that the products were healthy. Looking back at this successful case, there are questions not yet clarified. The factors that elicited the perception of guilt-free and less guilt haven't been validated. It could be the different texture perceived in tasting or the description in the concept board. More questions were further inspired regarding the concept of guilt-free and less guilt:

- (1) Can this perception give a new perspective of differentiating food and beverage products?
- (2) Is it essential to product and brand success or predicting eating behavior or food choice?
- (3) Does it correlate with a liking in a certain way?
- (4) How could this perception connect with “Good for you” and “Better for you” claimed by many food companies?

Chapter 1

Introduction

1.1 Market & consumer trend

1.1.1 Booming of U.S. snacking category as well as the global wellness economy

In recent years, there have been enormous amounts of increase in the demand for snacking. IRI research showed that 47% of the U.S. consumers eat more than three snacks per day ([Information Resources Inc., 2019a](#)). By showing the contrast of "meal preparation" aisles shrinking versus the expansion of "snacking and better for you" zone, Food Business News ([Schroeder, 2018](#)) provided a vivid snapshot illustrating how Dollar Tree seized the opportunity. Even though convenience stores have been considered as the heartland for shopping snacks, snacks are now available everywhere for consumers to purchase. Research data show that consumers eat snacks throughout the day ([Information Resources Inc., 2019b](#)). Compared to the year 2010, the snacking frequency has increased more than three times for early morning occasion, it was 26% in 2019, and nearly doubled for a late evening occasion, reaching 40%. The definition of snack has evolved with lifestyle change. It has been expanded from traditional four core categories, including savory snacks, sweet snacks, snack bars, and soft drinks to a wide variety of perimeter snacking products ([Nielsen, 2018](#)). Even though some food products' initial primary function

was outside snacking, by adding new product features, a snacking option was provided. For example, spreads transformed into snack packs, and a snack-sized portion of packaged fruit and vegetables.

Eating is just one of the holistic approaches consumers take to keep them well. Food & Beverage was ranked the third product category, following Health care and Personal Care categories, with 82% of the consumers agreed on it as part of their practices for self-care ([Information Resources Inc., 2018](#)). Health and Wellness have been valued as a \$450 billion market in the U.S., covering multiple Consumer Packaged Goods (CPG) categories ([Information Resources Inc., 2018](#)). Globally, a wellness economy, which encompasses industries that enable consumers to incorporate wellness activities and lifestyles into their daily lives, has witnessed a continuously expanding and is estimated at \$4.5 trillion ([Global Wellness Institute, 2019](#)) in the year 2019 versus \$4.2 trillion in the year 2017 representing 5.3% of 2017 global economic output. Among it, Healthy Eating, Nutrition, and Weight loss sector were estimated for \$702 billion ([Global Wellness Institute, 2018](#)). Even though the focus of this study was within the food and beverage category, the author would like to keep a holistic understanding of the overall picture, as healthy eating and wellness management were one of the critical motivations for snacking.

1.1.2 Consumers' greater healthy and ethical living trend

Consuming trend of "Back to Basics" or "Seeking of simplicity", which favor hyper-local food, in-season fruit and vegetables, homemade, and using natural ingredients, was listed as one of the top 10 leading trends ([Euromonitor International, 2019b](#)). It has been captured across different CPG categories, from the rise of the artisan beauty using all-natural ingredients in skincare products, to craft spirits with hand-made production process. In the author's opinion, this is an upgrade of the clean label or "simple" trend, which was popular several years ago. Mintel interpreted the contributor as consumers' concern of additives and fear for mass production; in the opposite, cleaner labels were found associated with healthier perception ([Mintel, 2016](#)). Moreover, excess on-pack communication may lead to less consumer engagement, making them not able to focus on key product properties. One research showed that 39%

of French consumers feel that excessive information on food and drink pack can make it hard to trust a brand ([Mintel, 2018](#)).

Conscious consumers are not only more mindful of their health and wellness management but are also concerned with animal welfare as well as the possible negative environment affected by the mass industrial production. They are demanding for sustainable solutions, such as plant-derived ingredients, opposing animal testing, seeking for grass-fed or pasture-raised product features. Beyond meat, an alternative-meat startup whose stock price has soared nearly 250% to \$87 per share since its IPO on May 2019 established its success based on its investors' faith that the plant-based meat market is going to boom (CBS NEWS), and it is just one case showing the fierce competition.

Over the past few years, it has been agreed that consumers' awareness of ocean pollution has gained momentum, which is reshaping consumers' expectations and their using behaviors of packaging. Consumers were becoming more sensitive towards plastics, especially single-use packaging, and more frustrated with the over-packaged goods coming together with the fast developed e-commerce. Globally, consumers are showing a willingness to pay more for environmentally conscious or eco-friendly products, as well as recyclable packaging based on an international lifestyle survey ([Euromonitor International, 2019a](#)). There was still a massive opportunity in package related innovation on extending food freshness, preserving ingredient fortification, and ensuring safe delivery. For example, 61% of Canadian fruit and vegetable buyers say they would be interested in packaging that keeps food fresh longer ([Mintel, 2018](#)). To keep plastic out of the sea, continuous effort in designing valuable packaging material will be critical. The latest 2020 Top 10 consumer trends revealed that reusable packaging initiatives were happening among younger generations ([Euromonitor International, 2020](#)).

Meanwhile, a Slow Food Movement, which began in Italy in 1986, has grown to a network of a million activists across more than 150 countries, with priority protecting biodiversity and defending Good, Clean and Fair food for all ([Slow Food International, 2020](#)), where

- GOOD: quality, flavorful and healthy food
- CLEAN: production that does not harm the environment

- FAIR: accessible prices for consumers and fair conditions and payment for producers

Therefore, the author was wondering if there was an underlying factor that leads people unconsciously to take the paths embracing a sustainable lifestyle, while pursuing both physical well-being and mental health solutions for themselves. And showing more empathy to the world, which includes other people, animals, and the environment.

1.2 Motivation of this dissertation

With consumers' increasing awareness of the environmental issues worldwide, continuous investigation on social values and how people's shopping and eating behavior shifts could be meaningful. New insights that would encourage consumers to eat healthier will benefit society, industry, and the environment globally.

Specifically, biodiversity loss, competition for resources, waste, climate change, and air pollution were not only gaining more attention but driving an ethical way of living. Beyond that, many consumers are treating their bodies like an ecosystem and seeking solutions that complement their health and wellness needs. How these different factors change consumers' engagement with health, and impact on their food choice, need continuous research.

Consumers are demanding more "Good for them" and "Better for them" products, while companies are not producing them, or if they are providing "Good for you" and "Better for you" foods for consumers, it is not meeting their standards. What consumers mean when they say "Good for them", may change over time. In other words, what indicators need to be measured basically. Many times, the benchmark of launched products was selected to help decision making. Still, it could only be useful for validation, facilitating launch decision making, not helpful in providing useful guidelines for initial phases of new product development.

Food companies that committed to launching new healthy products are trying hard to decode product design to delight the consumers. To seize the opportunity of gaining a portion of the growth in the snack category, companies disrupted their way in getting to know their consumers better. In 2018, PepsiCo partnered with Black Swan Data to develop "360 Always

on trend engine". A social media machine learning tool to understand consumers' engagement with food ingredients, brands and products ([Euromonitor International, 2019b](#)). The same year, GlaxoSmithKline PLC (GSK) launched its global digital innovation hub and brand incubator to work on projects that may benefit business in the long term, not necessarily for a three-year profit and loss statement ([Euromonitor International, 2019b](#)). Communicating ambitious corporate goals to promote sustainable values ([Danone, 2018](#)) and investing in new product development for adding features to address wellness and sustainability only represent a few strategies companies leveraged. Nevertheless, benefit claims such as Non-GMO, No artificial colors, Gluten-free, and Organic seem to be winning consumers ([Information Resources Inc., 2017](#)). With increasing product features designed to address health, wellness, and sustainability, how well these claims influence consumers' emotions and their food choice need to be researched.

This dissertation intends to gain insights on promoting healthy and sustainable eating behaviors by exploring the role of guilt on food choice. The author would hope the concept and approaches presented in the dissertation could enable other researchers to think differently in developing new healthy snack products.

1.3 Literature review on research opportunities and methodologies

1.3.1 Concept of food related guilt

Limited work was done studying guilt perception in the sensory and consumer science domain

The concept of emotions is somewhat vague and is used as a collection noun for all kinds of affective phenomena ([Desmet, 2002](#)). Emotions are defined as short-term affective responses to particular stimuli, situations, or events having reinforcing potential ([Gibson, 2006](#)). Most recently, emotions were described as intense feelings, which developed quickly in response to a specific stimulus ([Giboreau and Meiselman, 2018](#)). There has been research in specific emo-

tions: such as Surprise, Regret, Sympathy, Empathy, Embarrassment, and Anger (Laros and Steenkamp, 2005). Another study demonstrated that consumers were inclined to use positive emotions in describing food and food-related experiences (Desmet and Schifferstein, 2008). Similarly, it was found that questionnaires designed for food generally have a large proportion of positive words (King and Meiselman, 2010).

Guilt was mainly considered as one aspect of emotions in early research work. In developing the Differential Emotions Scale (DES), guilt was proposed as one of the ten fundamental emotions, which is essential to the development of conscience and morality (Izard, 1977). Other researchers have also considered guilt as one aspect of emotions (Laros and Steenkamp, 2005; Richins, 1997). Hierarchy model of emotions (Laros and Steenkamp, 2005) proposed that four positive emotions (contentment, happiness, love, and pride) and four negative ones (sadness, fear, anger, and shame) are basic emotions. Depressed, sad, miserable, helpless, nostalgia, and guilt were subordinate to the emotion of sadness.

Overall, there is lack of research on the effect of guilt on food choice. The literature review indicated that a deeper understanding of guilt perception is needed to better understand its potential impact on food choice and eating behavior. Most of the published studies considered it as one aspect of emotions. However, emotion is a short-term affect response to a particular stimulus. The author of this study made the hypothesis that guilt perception may not necessarily be a short term reaction; it could be more complex, and function as a belief impacting consumers' eating behavior.

Theories of guilt

With limited work about guilt found in the sensory and consumer science domain, literature search work was expanded to the psychology area for better understanding the topic, which is reasonable considering sensory and consumer science is a relatively new developed field with a foundation built in multiple scientific disciplines including psychology (Lawless and Heymann, 2010).

Definition of guilt and its determinants

Guilt was defined as "an individual's unpleasant emotional state associated with possible objections to his or her actions, inaction, circumstances, or intentions" (Baumeister et al., 1994). Usually, guilt is experienced from wrongdoing and responsibility for causing harm (Izard, 1977; Kubany and Watson, 2003). People feel guilty when they become aware that they have broken a rule and violated their standards or beliefs (Izard, 1977). The behaviors that evoke guilt normally violated a moral or ethical code. The codes might be implicit and accepted intuitively. State it in another way, although almost everyone might have an ethical framework which guides one's interpersonal and social behavior, very few people carried the beliefs in consciousness all the time (Izard, 1977).

At the same time, some researchers referred to guilt as "moral emotions" together with shame, embarrassment, and pride, due to their role in supporting behavior consistent with social norms (Tangney et al., 2007). Meanwhile, for emotions playing a critical role in motivating and regulating people's thoughts, feelings, and behaviors, such as shame, guilt, and pride, social-psychologists categorized them as self-conscious emotions (Tracy and Robins, 2004). In contrast with basic emotions, such as sadness and joy, which are associated with basic survival needs and linked to universal facial expressions, self-conscious emotions require a higher level of cognitive involvement (Tracy and Robins, 2004), which is why they are also called 'self-conscious' or 'self-relevant' emotions (Tangney et al., 2007).

Actual behavior is not necessary for guilt to have an effect in the moral emotions domain, where, shame, guilt, embarrassment, and pride are members of a family of "self-conscious emotions" (Tangney et al., 2007). Guilt-proneness, which indicates a dispositional tendency to experience guilt, is defined in the realm of moral emotions (Leith and Baumeister, 1998; Tangney et al., 2007).

Components of guilt: example of the multidimensional model of trauma-related guilt

It was well recognized that guilt possessed two components: a socio-legal status related with transgressing of certain rules, meaning that if someone violated a rule, law, or moral code, that person was usually considered to be guilty by definition. The other component has an emotional focus as feeling guilt(y) (Baumeister et al., 1994; Ortony, 1987). Some researchers

describe the two elements differently as affective and cognitive elements ([Izard, 1977](#); [Kubany et al., 1996](#)).

A multidimensional model of guilt generated based on clinical work with trauma survivors was found inspiring in its way, defining the factors, which included ([Kubany and Watson, 2003](#)):

- Affective component of distress about the negative outcome
- Cognitive component with four interrelated beliefs about one's role in the event:
 1. perceived responsibility for causing a negative outcome
 2. perceived insufficient justification for actions taken
 3. perceived violation of values
 4. beliefs about foreseeability and preventability - the degree to which a person thinks he or she knew (in advance) that a negative outcome was going to occur and could have prevented its occurrence.

In this dissertation, the author would like to focus on the emotional sense of guilt: the feelings of guilt. The profile of emotions in the general guilt situation was summarized in a decreasing effect: distress, fear, interest, shyness, anger, surprise, and joy ([Izard, 1977](#)). This suggested the emotion construct that could accompany guilt. However, with respect to food, which different emotional constructs that may correlate with guilt will need to be explored.

Innate capacity of guilt and its affective sources

Causes of guilt could vary widely from individual to individual, from one ethnic group to another, and from culture to culture ([Izard, 1977](#)). The diversity inherent of guilt was also described as "we can feel guilty in all sorts of ways and for all sorts of things" ([Neblett, 1974](#)). As described by Baumeister: "... guilt means feeling bad, and so the capacity for guilt presumably begins with a natural basis for feeling bad". Considering guilt as an innate capacity, two affective sources of guilt have been identified: empathic arousal and anxiety over social exclusion ([Baumeister et al., 1994](#)). Firstly, it was proposed that guilt originated in the empathic recognition of another person's distress ([Leith and Baumeister, 1998](#)). Anxiety felt over the possible

loss of a social bond or getting rejected by others due to wrongdoing was proposed as the second root of guilt (Baumeister et al., 1994). Understanding sources of guilt is vital for further understanding of the role of guilt in social functioning.

Impact of guilt on consumer decision making and behaviors

Being one of the self-conscious emotions, guilt was found to be involved in a wide variety of behaviors of empathy and caregiving (Tracy and Robins, 2004). For example, guilt was considered as an essential cognitive component of empathy. Research results suggest that guilt-prone people are better at perspective-taking, which might produce beneficial relationship outcomes (Leith and Baumeister, 1998). Besides, guilt could motivate individuals to accept responsibility and take reparative actions like confessions, apologies, etc.. therefore, lead a moral path in life (Tangney et al., 2007).

There is a growing acknowledgment regarding how guilt is associated with problem-focused coping, where consumers act to make a positive behavioral change in terms of ability as well as willingness (Leith and Baumeister, 1998), which made the measure of guilt a useful tool in predicting potential positive behavioral change. Perception of Drinking Scale (PODS) measured alcohol use-related guilt and shame. This scale was developed to associate disordered alcohol use and experience of negative alcohol-related consequences (Schroeder, 2018). Results found that alcohol use related guilt was positively related to the experience of any adverse outcome experienced during alcohol use. In addition, alcohol use related guilt was positively related to readiness to change. A positive influence of guilt has been demonstrated in reducing unhealthy food consumption (Mishra and Mishra, 2010). In brief, the researcher found that a price discount enabled consumers to justify their purchase of unhealthy food as it was a lower price, therefore mitigating their guilt. This potentially helped them to consume unhealthy food in moderation, as well as to reduce the chances of self-control failure.

Moreover, guilt has been demonstrated to convince consumers of the effectiveness of taking sustainable consumption choices by triggering an increase in perceived consumer effectiveness (PCE). Consumers were more likely to enact sustainable behaviors when they felt that

their decisions would make a difference ([Antonetti and Maklan, 2014](#)). This was explained by the influence that guilt has on consumers' ability to use techniques of problem-focused coping with justifying and rationalizing the choice of unsustainable alternatives ([Antonetti and Maklan, 2014](#)).

Research opportunity: lack of overview of product characteristics and using experience in eliciting guilt perceptions

Consumers' feels and beliefs could affect food choice. Food (choice) is a reflection of who consumers are. More and more, consumers care about not only the ingredient list but where the ingredients are coming from. Recent Snacking Survey showed that 35% of US consumers wanted sustainable packaging ([Information Resources Inc., 2017](#)). On the opposite, consumers' food choice and consumption affected their emotions, which was considered as the main emphasis of product research ([Cardello et al., 2012](#)).

The food choice questionnaire ([Steptoe et al., 1995](#)) identified nine factors that could impact food choice: health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity, and ethical concern. Understanding the effect of guilt on top of the current food choice model could be meaningful.

Lack of a clear definition of the meaning of guilt related perceptions were one of the challenges of this study. Unlike the concept of consumer wellness associated with foods or consumers' variety-seeking, where there were multiple research works offering a clear definition of the scope, there has not yet been a clear concept delineated or published on guilt perception in food choice as far as the authors know. Addressing this question led to the first study of this dissertation, which was to identify the factors that could elicit guilt in regards to food.

Research technique solution: focus group discussion

Focus Group Discussion (FGD) is "a research technique that collects data through group interaction on a topic determined by the researcher" ([Morgan, 1996](#)). This definition clarified the

three essential components of FGD: first, data was obtained from a purposely selected group of individuals rather than from a statistically representative sample of a broader population; second, the interaction through the discussion was the source of the data; third, it acknowledged that it was the researcher's interest that directed the discussion.

As a qualitative approach to gain an in-depth understanding of social issues, FGD has been frequently used to uncover insights for promoting healthy eating. For example, understanding perception of food classification and values attributes in guiding Mexican working mothers' complementary food choices for their young children ([Rodriguez-Oliveros et al., 2014](#)), understanding the ways people interpret healthy eating for seeking ways to promote healthy eating ([Bisogni et al., 2012](#)); helping nutrition professionals better understand the cognitive food choice process of senior adults by eliciting factors important to their food choices ([Falk et al., 1996](#)), And uncovering innovation opportunities by obtaining consumer-driven definition of tradition food products in European countries ([Guerrero et al., 2009](#)) either by using alone or combined with other qualitative or quantitative methods.

With the launch of the new mandatory EU logo for organic food, focus groups were used for understanding consumers' perception of different organic certification schemes and the corresponding logos in five European countries. Four potential added values that could differentiate existing certification schemes have been identified: stricter production standards, more rigorous control, domestic origin, and fair prices for farmers ([Janssen and Hamm, 2011](#)).

Mixed-methods approaches allowed researchers to integrate the complementary strengths of multiple methods for addressing different but well-coordinated purposes within the same overall research projects ([Morgan, 1998](#)). To elicit consumers' preferences regarding organic food by identifying additional ethical attributes, Zander and her colleagues identified three other moral characteristics ('higher animal welfare', 'local production' and 'fair producer prices') which were most interesting to consumers. Based on the input from the earlier research steps, FGD was further applied with the objective to elicit consumers' responses to different ways of communicating these attributes so as to benefit subsequent research step by providing a promising manner in assessing the relevance of the characteristics in purchase decision making ([Zander et al., 2012](#)).

Together with other qualitative approaches, focus groups were implemented to assist researchers in identifying survey questions (Morgan, 1998) or providing valuable input in developing questionnaires: such as Trauma-Related Guilt Inventory (TRGI) (Kubany et al., 1996) and the Guilt and Shame Questionnaire for Adolescents of Parents with a Mental Illness (GSQ-APMI) (Bosch et al., 2017).

Study design considerations for focus group discussion

Rationale

The benefits of using focus groups in collecting rich information by using group interactions was a unique advantage well recognized by researchers (Onwuegbuzie et al., 2009); two points need to be highlighted here as they justified the rationale of using focus groups in this dissertation: First, it provided a socially-oriented environment which can increase participants' sense of cohesiveness, therefore, helping them to feel safe sharing opinions; furthermore, the interactions that occur among the participants created the possibility for more spontaneous responses (Onwuegbuzie et al., 2009).

In this dissertation, considering rare information exists about how product characteristics elicit guilt, it would be a good opportunity to explore the question with focus groups, especially, guilt related feelings could be collected based on participants' personal experience sharing using their own language, from the spontaneous responses generated through exchange between participants. Furthermore, the flexibility in adding different activities in the discussion could facilitate the depth and width of the output.

Planning & Operation

The statement of "participant identification was perhaps the most critical step since the technique was largely based on group dynamics and synergistic relationships among participants to generate data" (Nyumba et al., 2018), indicating the importance of recruiting. It was suggested that between 6 and 12 participants were sufficient to include enough participants to yield diversified information but still be easy for management (Onwuegbuzie et al., 2009). Another consideration was about how many groups to plan, the common rule of thumb was that

most projects consist of four to six groups (Morgan, 1996). However, this could be decided until a clear pattern emerges and subsequent groups do not produce new information (Nyumba et al., 2018). Depending on the research objective, sampling strategies consciously varied the composition of groups, were also described as segmentation, which provided an advantage of comparison in data analysis, as well as facilitating discussions by making the participants more similar to each other (Morgan, 1996). Addressing the extent to which identical questions and procedures were used in every group, standardization facilitated the direct comparison of the discussions between groups (Morgan, 1996).

Product grouping activity: sorting task

One of the critical research questions to be addressed in the focus groups was how consumers perceive the product differences based on their different guilt perceptions. This was a classification question, requiring information about how people perceive the objects as well as which characteristics were used for classification between a series of objects (Varela and Ares, 2012).

Sorting task or categorization was a simple procedure for understanding similarities and differences between objects by asking assessors to place "similar" objects together and to separate "dissimilar" ones (Lê and Worch, 2014). Because it was simple and relatively easy for subjects to carry out, the task was widely used in sensory and consumer science to get information about sensory characteristics of products either with trained assessors or naive consumers (Cadoret et al., 2009; Varela and Ares, 2012). Multiple analysis approaches, for example, analyzing the raw data using Multiple Correspondence Analysis (MCA) could provide a representation of the product space, which would reflect similarities and differences provided by all subjects, therefore, making it possible to shed light on how the products are perceived and get insights into consumer choice and behavior (Cariou and Qannari, 2018; Lê and Worch, 2014). Once the sorting was completed, assessors were asked to provide descriptive words for each of the groups they formed (Varela and Ares, 2012). The textual data were of utmost importance as they indicated the criteria that were the most significant to consumers in differentiating the objects. The textual data could be transformed into a contingency table before being submitted to Cor-

respondence Analysis (CA), making it possible to add another layer of valuable descriptive information on the product space (Lê and Worch, 2014).

1.3.2 Development of food-related guilt scales

Existing guilt measures

Different types of questionnaires have been developed to measure the guilt trait, which was referred to as the "propensity to respond towards experiences with guilt" (Lacerenza et al., 2019). However, there is no published food-related guilt scale to the author's best knowledge.

The Personal Feelings Questionnaire-2 (PFQ2) that included a 6-item Guilt sub-scale and a 10-item Shame sub-scale, required subjects rate on 4-point frequency scale (ranging from you never experience the feeling (0) to you experience the feeling continuously or almost continuously (4)) regarding the guilt related terms: 'Mild guilt', 'Worry about hurting or injuring someone', 'Intense guilt', 'Regret', 'Feeling you deserve criticism for what you did', 'Remorse' (Harder and Zalma, 1990).

The Test of Self-Conscious Affect (TOSCA)-3 was a scenario-based measure designed to assess individuals' guilt-proneness, shame-proneness, as well as four other self-conscious emotions (externalization, detachment/unconcern, Alpha pride - pride in self and Beta pride - pride in behavior). It was a frequently used in social-personality literature to measure guilt and shame (Robins et al., 2007), including 11 negatives and five positive scenarios generated from participants' descriptions of personal experiences of guilt, shame, and pride. A five-point Likert scale ranging from 1 (not likely) to 5 (very likely) was used for rating.

There has been a growing need for developing domain-specific experience of guilt (Leeming and Boyle, 2004). Meaning, contextualized guilt scales focused on the extent to which an individual tended to experience guilt in response to a particular type of event (Lacerenza et al., 2019). For example, the Trauma-Related Guilt Inventory (TRGI) assessed the guilt tendency responding to trauma (Kubany et al., 1996) and the Perceptions of Drinking Scale measured alcohol use-related shame and guilt (Treeby et al., 2019)

Based on the literature review, there has been no scale available measuring food-related

guilt. The design of the first study intended to identify which factors could elicit guilt related to food and why guilt experience occurred would make it possible for designing a scale to measure food-related guilt.

Food choice questionnaire and its application in consumer segmentation

There has been growing interest in studying people's attitudes, beliefs, and behaviors regarding food choice, and different versions of instruments have been developed or updated for better meeting the need. Among them, a food choice questionnaire was developed to create insights into Food choice motives related to consumers' motives, reasons, or motivations for choosing or eating food ([Onwezen et al., 2018](#)).

The Food Choice Questionnaire (FCQ) was developed in 1995 to assess comprehensive factors that might influence food choice decisions at an individual level by addressing both health and non-health related motives ([Steptoe et al., 1995](#)). Nine factors (36 items) emerged through factor analysis on responses from a sample size of 358 by using the questionnaire construction procedures. Later it was complemented with animal welfare, environmental protection, and political and religious values ([Lindeman and Väänänen, 2000](#)). The food choice questionnaire was widely used to understand consumers' food choices in different cultures ([Honkanen and Frewer, 2008](#)) and age ([Piggford et al., 2008](#)). It was argued that the length of the survey decreased the quality of the respondents' answers and brought disadvantages for researchers. Therefore, the solution of developing a single-item questionnaire was developed ([Onwezen et al., 2018](#)).

The heterogeneity of consumers need to be taken into account; consumer segmentation, which was a classification of consumers into homogeneous groups on one or more essential characteristics, provided a solution to deal with heterogeneity. Food choice motives were considered as a valuable basis for consumer segmentation. By focusing on the willingness to try functional foods, three segments with different food-choice rank orders were found, explaining the different preference patterns for functional foods ([Ares and Gámbaro, 2007](#)). More pieces of evidence showed that consumers were seeking both the healthy food choice solution through

a nutritional intake and the society's sustainable food choice ([Aschemann-Witzel, 2015](#); [Marchi et al., 2019](#)). By prioritizing food category attributes, three consumer segments were identified: a pro-self, an average, and a sustainable, conscious segment ([Verain et al., 2016](#)). The designated segments were found different in their general food choice motives, with pro-self cluster having the lowest ratings on all sustainability motives (sustainable, animal-friendly, origin, environmentally friendly, label, regional, organic) in contrast to all the highest ratings from conscious clusters.

Research opportunity for developing food-related guilt scales

The growing trend of sustainable living determines the need for understanding food-related guilt perceptions and how it might impact food choice is beneficial in multiple ways. Guilt was considered potentially convincing consumers of the effectiveness of sustainable consumption choices ([Antonetti and Maklan, 2014](#)). Further exploration of how guilt tendency works with respect to food products could provide practical guidelines to promote a healthy and sustainable eating behavior.

Insights into consumers' guilt tendencies related to food products would be necessary for marketing decisions, especially market segmentation, because different advertising and product portfolio management strategies could be planned accordingly.

Also, insights into how different product features might elicit consumers' guilt perception would be critical in developing new healthy snack products. As shown in previous research, it wouldn't be just the nutrition and taste properties impact on consumers' purchase intent.

Study design consideration for instrument development

In this section, critical steps for questionnaire construction, validation, and emotion measurements were reviewed.

Questionnaire construction

Multiple approaches have been used alone or mixed in developing initial scale items. Introducing concepts to consumers and asking them to generate statements were applied and sup-

plemented with or without devising by researchers (Bell and Marshall, 2003; Pliner and Hobden, 1992). Combining literature review, two focus-groups discussions, and 30 in-depth interviews, brought out the initial 120 items for variety-seeking scale (Van Trijp and Steenkamp, 1992). In developing the food choice questionnaire, the 68 items were generated through literature review and discussion with nutritionists and health psychologists (Steptoe et al., 1995).

Scale validity

What makes a scale valid? Multiple sources of validity evidence have been applied in previous researches. Internal consistency, correlations among test components, relations to other variables, and factor analytic techniques. The introduction of the theoretical meaning of the construct was considered as the initial step for questionnaire construction. Neophobia was conceptualized as "a personality trait, a continuum along which people can be located in terms of their stable propensity to approach or avoid novel foods" (Pliner and Hobden, 1992). Food neophobia scale was developed to examine the neophobia-neophilia continuum in humans. On the other hand, the variety-seeking scale was defined as domain-specific, indicating that it was not a personality characteristic generalizable across all product categories, but specifically for food consumption context (Van Trijp and Steenkamp, 1992). One important aspect here was the assumption that the levels of an examined scale would vary from one individual to another lying on a continuum. Therefore, an individual level could be measured.

Score reliability implied preliminary evidence that a reliable measure of a sample of behavior was obtained and thus could provide indirect evidence of test score validity (Urbina, 2014). Reliability analysis was widely approached in terms of testing the preliminary scale and refinement of the initial scale items. The small range of a pilot test of the preliminary scale for removing or refining items causing confusing or having similar contents before submitting to a bigger sample size (Van Trijp and Steenkamp, 1992) was considered by the author as a good practice although it might not be reported in every instrument design study. Coefficient alpha, also known as Cronbach's alpha, provided a solution assessing the internal consistency across test items constituted the scale. When homogeneity across all test items was desired, Cronbach's alpha was an index of the extent to which the aim was realized (Urbina, 2014). Low corrected

item-total correlations indicated that the item did not correlate well with the scale. Overall, the acceptable cutoff value was suggested as 0.3 (Nunnally and Bernstein, 1994).

Cross-validation, provided "verification of the instrument's reliability on a different sample of subjects" (Van Trijp and Steenkamp, 1992). Assessment of construct's stability-indicating if the scale was measured to be a relatively stable consumer characteristic required the scale to be administered to a sample of subjects twice with 2-3 weeks interval (Van Trijp and Steenkamp, 1992).

Correlation between different measures provided convergent and discriminant validity evidence of the construct (Urbina, 2014). Convergent validity indicated high correlations between the scale scores and those of other instruments to assess the same construct; in contrast, discriminant validity was based on the patterns of divergence, such as consistently low correlations between measures that were supposed to differ.

Factor analysis could provide a source of validity evidence on the scale's internal test structure. A large number of studies used factor analysis to reduce the number of dimensions needed to describe data that were derived from a set of measured variables and to discover the structure underlying the measures (Bell and Marshall, 2003; Kubany et al., 1996; Steptoe et al., 1995; Van Trijp and Steenkamp, 1992). Several different procedures could be conducted to extract factors, depending on the assumptions and methods that are used. Factor analysis produce a table with the loadings of each original variable item on the factors extracted from the analysis, which could be examined to determine the nature of the factors that account for most of the variance of the original data set. Meanwhile, goodness-of-fit statistics provided an evaluation of the adequacy between the data and the models; in other words, how well the model fits the data (Hooper et al., 2007):

- The root mean square of residuals (RMSR) is the square root of the difference between the residuals of the sample covariance matrix, ranging from zero to 1.0 with well-fitting models obtaining values less than 0.05.
- The root mean square error of approximation (RMSEA) index indicates how well the model fits the population's covariance matrix. Recently, the proposed cutoff value suggested that

below 0.07 showed a good fit.

Total scale scores could be calculated by adding the ratings for each item after reversing if needed ([Bell and Marshall, 2003](#)). The distribution of the composite scores provided one source of validity evidence if the hypothesis was that individuals would vary in the scale they were tested with. This was important as the variability of scores can be useful in interpreting test results, and normal distribution was desired for norm assessments considering its statistical advantages. The distribution of the variety-seeking scale was not normal, and the researcher argued that there was no reason to believe that the variety-seeking tendency concerning foods was normally distributed in the population ([Van Trijp and Steenkamp, 1992](#)). For the purpose of a meaningful interpretation of a respondent's test scores, it was helpful to choose the correct group against which to interpret the result. In developing the variety-seeking scale, the first and the third quartile ratings were used to categorize low and high variety-seeking tendencies.

Assessment of discriminating capacity provided another source of validation evidence. Two aspects of the discriminating ability of the scale could be evaluated: Firstly, after generating the clusters based on the total scale scores, whether or not discriminating rating scores on all the items were achieved could be checked between groups. The Personal Involvement Inventory was used to evaluate consumers' involvement with chocolate milk desserts enriched with antioxidants, and discriminating scores were found across all items ([Ares et al., 2010](#)). Secondly, how the consumer segments would differentiate in terms of their food choice and eating behavior was another essential aspect to explore after building the scale, as it would provide practical implications on the application of the scale. By using the Food Involvement Scale to examine the relationship between involvement and ability to discriminate perceived taste intensity, results showed that consumers with a higher level of involvement perceived more significant differences between samples on sweetness, saltiness and flavor strength, but not for perceived sourness ([Bell and Marshall, 2003](#)).

Questionnaires related to emotions

This section briefly reviews how different emotion questionnaires have been designed. Understanding which emotions highly correlated with guilt with respect to food was one of the

objectives of this study.

EsSenseTM Profile used a list of 39 emotion words that were rated on a 5-point category scale from "not at all" to "extremely" (King and Meiselman, 2010). A shorter version EsSense25 was further developed through sorting and clustering methods (Nestrud et al., 2016). Geneva Emotion and Odor Scale (GEOS) which had 36 terms was designed for odors by using factor analysis (Chrea et al., 2008). A reduced emotion questionnaire for odors, named as ScentMove, was proved that it could produce similar and useful discriminative results as GEOS (Porcherot et al., 2010). It comprised a set of six-word triads that were rated on a 10-point line-scale from "not at all relevant" to "extremely relevant". EmoSemio, which was designed through the decomposition of the interview texts (semiotic approach), had a series of 23 semantic categories. It was a product-specific questionnaire for use with chocolate and hazelnut spreads (Spinelli et al., 2014).

Richins constructed the Consumption Emotion Set (CES) incorporating emotions that could emerge in consumption situations with three criteria keeping in mind: Firstly, the measure should cover the range of emotions most frequently experienced in a wide range of consumption situations, and it should measure these emotions with an acceptable level of reliability. Secondly, the measure should be brief enough that it could be used in surveys or field studies. Thirdly, the emotion descriptors in the measure should be words that are familiar to and readily understood by consumers (Richins, 1997). The author considered these criteria was critical for developing the emotional construct related to guilt as well.

Despite the criticism on semantic issue and redundancy, emotional words were used commonly for consumers to check (CATA) or rate (RATA, using a numbered or labeled category of unstructured line scale ranges from "none" or "not at all" to "very high" or "extremely") in questionnaires (Prescott, 2017) (Cardello and Jaeger, 2016). Best-worst Scaling was a method repeated for multiple word combinations. Although it might suffer for the burden of numerous evaluations (Jaeger and Cardello, 2009), it was considered favorable for cross-cultural research as no scale anchoring or scale categories were used (Cardello and Jaeger, 2016). Due to that, emotion words might suffer from individual variations in word understanding or usage (Barrett, 2004). It might be better to use a semantic differential scale specifying the end anchors

instead of showing several anchors with different labels. Caution is still needed here, as the two anchor points were not always apparent opposites, which could potentially confuse respondents (Richins, 1997).

Understanding which emotion construct elicited together with guilt perceptions with respect to food is important. A CATA question with emotional items collected from focus groups is planned to be used in surveys for identifying emotions that are highly correlated with guilt perceptions.

1.4 Research goal and objectives

There is a continuous need to explore how consumers engage in healthy eating behaviors. The research opportunity to fill the gap of understanding guilt perception in food choice was identified. The goal of this dissertation was to develop a holistic approach leveraging the new idea of "guilt-free pleasure" into new healthy snack product development: not only in seeking a way of segmenting consumers, for better predicting their food behaviors, but also, to generate guides on how to develop products to delight consumers. The following research objectives were planned:

- Explore the variety of factors that may elicit guilt related perceptions in response to food and drink.
- Develop a new scale to measure consumers' basic guilt tendency related to foods.
- Develop a new scale to measure how different product features drive consumers' guilt perception.

With this in mind, consumer-based characteristics of food such as sensory perceptions, ingredients list, and nutrients content, etc. that may aid in identifying the perception of "guilt-free" or "less guilt" were investigated by using a qualitative research approach. These were followed by designing and validating instruments to measure food-related guilt perceptions

broadly by using quantitative online surveys. This research design used the strengths of qualitative methods for exploration to ensure the instrument under construction not only covers the crucial dimensions but also asks about the questions in an appropriate fashion.

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Chapter 2

Exploration of the Food-related Guilt

Concept

2.1 Abstract

There is a continuous need to explore how consumers engage with healthy & sustainable eating behaviors. “Guilt” is a complicated belief that impacts consumers’ eating behavior. Consumer-based characteristics of food that might aid in identifying the perceptions of "guilt-free", "less guilt", or "guilt" were investigated using Focus Groups. A sorting task was applied during the discussions to identify product grouping patterns by consumers based on different levels of guilt perceptions they have had with 18 food and beverage products. Four categories of 45 factors were identified that could elicit guilt perceptions, including a) intrinsic and b) extrinsic product characteristics, c) situational factors, and d) socio-cultural factors, indicating the complexity and multidimensionality of the "guilt" concept. Moreover, guilt perceptions were found to have a potential impact on leading consumers to seek healthier and sustainable food solutions by positively impact on their food choice, eating & drinking behavior, purchase decision making, and life living. This learning justified the importance of understanding guilt perception in promoting healthy eating behaviors. Furthermore, three product groups distinguished out from the Products map by running Correspondence analysis, which implied the potential of using guilt related perceptions for product differentiation. A "white space" of snack products that could deliver "Guilt-free pleasure" was identified. This provides new opportunities for healthy snack products’ development.

Keywords: Focus group, Sorting, Guilt, Food choice

2.2 Introduction

2.2.1 Background

Eating is one of the holistic approaches used by consumers to keep themselves well. Food & Beverage was ranked as the third product category (82%), following Health care and Personal care, that consumers noted as part of their self-care practices ([Information Resources Inc., 2018](#)).

In recent years, there has been a continuous increase in the demand for snacking. Snacking frequency during the early morning occasion increased from 7% to 26% and nearly doubled for a late evening occasion, reaching 40% in 2019 compared to 2010 ([Information Resources Inc., 2019](#)). Not only did snacking frequency become prevalent during the day, but the definition of snack also changed along with the eating behavior. The snack category expanded from the traditional four core categories of savory snacks, sweet snacks, snack bars, and soft drinks to a wider variety of perimeter snacking products with new snacking features, such as snack-sized portions ([Nielsen, 2018](#)).

With consumers' increasing awareness of the environmental pressures worldwide, investigation on consumers' food choices and eating behavior could be meaningful for encouraging consumers to eat healthier, as well as benefit industry and the environment globally. However, the path to success has not always been obvious. On the one hand, consumers were demanding more "Good for them" and "Better for them" products, while some companies were not producing them. Or if the companies were producing "Good for you" and "Better for you" products for consumers, the products did not always fulfill other consumer needs such as sensory quality or price. Part of the mismatch was because companies did not necessarily know how to fulfill the need for "guilt-free" products that met other needs as well. Very often, a benchmark of launched products that were thought to be healthful was selected to help companies in their decision making. That could be useful for product validation and helping facilitate the decision making concerning launch of the product. Benefit claims such as "Non-GMO" (i.e. (No Genetically Modified Organisms), "No artificial colors", "Gluten-free" and "Organic" seemed to

be winning consumers ([Information Resources Inc., 2017](#)) and potentially could be related to "guilt free".

2.2.2 Research opportunities and hypothesis

In developing the Differential Emotions Scale (DES), guilt was considered as one of the ten fundamental emotions ([Izard, 1977](#)). Later, researchers mainly followed this, considering guilt as one aspect of emotions ([Laros and Steenkamp, 2005](#); [Richins, 1997](#)). However, emotions are short-term affect response to a particular stimuli ([Gibson, 2006](#)). In the Hierarchy model of emotions proposed by [Laros and Steenkamp \(2005\)](#), together with depressed, sad, miserable and helpless, guilt was proposed as subordinate to the emotion of sadness, which was one of the four basic negative emotions. It was observed that consumers inclined to use positive emotions in describing food and food-related experiences ([Desmet and Schifferstein, 2008](#)), which partially explained why questionnaires designed for food typically had a large proportion of positive words ([King and Meiselman, 2010](#)).

The literature review indicated a deeper understanding of guilt perception regarding its effect on food choice and eating behavior was needed. Most of the published studies considered it as one aspect of emotions. The authors of this study made the hypothesis that guilt perception may not necessarily be a short term reaction; it could be more complicated, function as a belief in impacting consumers' eating behavior.

With limited work about guilt found in the sensory and consumer science domain, the literature search was expanded to the psychology area. Guilt has been defined as "an individual's unpleasant emotional state associated with possible objections to his or her actions, inaction, circumstances, or intentions" ([Baumeister et al., 1994](#)). People felt guilty when they became aware that they have broken a rule and violated their standards or beliefs ([Izard, 1977](#)). These need not be short-term, but can be a more complicated belief that impacts consumers' eating behavior. At the same time, some researchers referred to guilt as "moral emotions" together with shame, embarrassment, and pride, due to their role in supporting behavior consistent with social norms ([Tangney et al., 2007](#)). Meanwhile, for emotions playing a critical role

in motivating and regulating people's thoughts, feelings, and behaviors, such as shame, guilt, and pride, socio-psychologist categorized them as self-conscious emotions (Tracy and Robins, 2004). Guilt-proneness indicating a dispositional tendency to experience guilt, was defined in the realm of moral emotions (Leith and Baumeister, 1998; Tangney et al., 2007). The profile of emotions in the catholic guilt situation was summarized in a decreasing effect: distress, fear, interest, shyness, anger, surprise, and joy (Izard, 1977). This suggested that the emotion construct could accompany guilt. However, with respect to food, what different emotional constructs might highly correlate with guilt would need to be explored.

Being one of the self-conscious emotions, guilt was found to be involved in a wide variety of behaviors of empathy and caregiving (Tracy and Robins, 2004). For example, guilt was considered as an essential cognitive component of empathy, with research results suggesting guilt-prone people were better at perspective-taking, which might produce beneficial relationship outcomes (Leith and Baumeister, 1998). Besides, guilt can motivate individuals to accept responsibility and take reparative actions like confessions and apologies; therefore, leading a moral path in life (Tangney et al., 2007). A positive influence of guilt was demonstrated in reducing unhealthy food consumption (Mishra and Mishra, 2010). In brief, the researcher found that a price discount enabled consumers to justify their purchase of unhealthy food as it was a lower price, therefore mitigated their guilt. This potentially enabled them to consume unhealthy food in moderation, as well as reduced chances of self-control failure. Moreover, guilt was demonstrated to convince consumers of the effectiveness of taking sustainable consumption choices by triggering an increase in perceived consumer effectiveness (PCE), where consumers were more likely to enact sustainable behaviors when they felt that their decisions would make a difference (Antonetti and Maklan, 2014).

Extending the research of guilt on consumer decision making and behaviors concerning food is necessary. The food choice questionnaire (Step toe et al., 1995) identified nine factors that can impact food choice: health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity, and ethical concern. Later, animal welfare, environmental protection, and political and religious values were included (Lindeman and Väänänen, 2000). Understanding the effect of guilt on food choice and eating behaviors could be meaningful.

Lack of clear definition of what were guilt perceptions concerning food was one of the challenges of this study. Unlike the concept of consumer wellness associated with foods (King et al., 2015) or consumers' variety seeking (Van Trijp and Steenkamp, 1992), where there were multiple research available sets up the foundation, offering a clear definition of the scope. There has not yet been a clear concept delineated or published on guilt perception in food choice as far as the authors know. To address this question, this study aimed to understand what was guilt perceptions concerning food.

2.2.3 Rationale for choosing the Focus Group technique

Focus group discussions were frequently used to uncover insights for promoting healthy eating either by using alone or combined with other qualitative or quantitative methods: from understanding perception of food classification and value attributes in guiding Mexican working mothers' complementary food choices for their young children (Rodriguez-Oliveros et al., 2014) to understanding the ways people interpret healthy eating (Bisogni et al., 2012); from helping nutrition professionals better understand the cognitive food choice process of senior adults by eliciting factors relevant to their food choices (Falk et al., 1996) to uncovering innovation opportunities by obtaining consumer-driven definition of tradition food products in European countries (Guerrero et al., 2009). Together with other qualitative approaches, focus groups were implemented to assist researchers in identifying survey questions (Morgan, 1998) or providing valuable input in developing questionnaires, such as the Trauma-Related Guilt Inventory (TRGI) (Kubany et al., 1996) and the Guilt and Shame Questionnaire for Adolescents of Parents with a Mental Illness (GSQ-APMI) (Bosch et al., 2017).

Considering the lack of information that existed about how product characteristics elicited guilt perception, it would be an excellent opportunity to explore the question with focus groups, especially guilt related feelings that could be collected based on participants' personal experience sharing using their language. Flexibility in adding different activities though the discussion, could facilitate the depth and width of the output. How consumers perceived the product differences based on their different guilt perceptions, was a classification question, requiring

information about how people perceive the objects as well as which characteristics were attended to for classification between a series of objects (Varela and Ares, 2012). Sorting task or categorization was a simple procedure for understanding similarities and differences between objects by asking assessors to place "similar" objects together and to separate "dissimilar" ones (Lê and Worch, 2014).

2.2.4 Research objectives of this Study

This study aimed to gather foundational understanding of guilt perception associated with food. The study focused on investigating consumer-based characteristics of food that may aid in eliciting different levels of guilt perception: "guilt-free", "less guilt" or "guilty". The objectives of this study were to:

1. Understand which factors could elicit consumers' guilt perceptions concerning food.
2. Explore how people made decisions and determine related emotional construct.
3. Understand how guilt factored into food choice or eating behaviors.
4. Examine the agreement among consumers on sorting the products based on guilt perceptions such as "guilt-free", "less guilt" or "guilty" including identifying the words consumers used to describe that food and the strategies used in product grouping.
5. attempt to uncover the concept of "Guilt-free pleasure".

2.3 Materials and Methods

2.3.1 Consumers

Source

Manhattan Kansas residents from the Center of Sensory Analysis and Consumer behavior (CSACB) database and Chicago residents from the P&K Research database were reached out. Consumers

Table 2.1: Focus group demographics

Group	Number of Participants	Age	Gender	Location
1	8	18 - 34 years	Two males, six females	Manhattan, KS
2	8	35 - 54 years	One male, seven females	Manhattan, KS
3	8	18 - 34 years	Four males, four females	Chicago, IL
4	8	35 - 54 years	Three males, five females	Chicago, IL

who were interested in the study could take the screening survey by clicking the link in the email. The screening survey could be found in Appendix.A.

Rationale in participant recruiting and selection

Focus group discussions were used to generate discussion on guilt related perceptions that might happen during different occasions of consuming or purchasing food and beverages. To facilitate participants discussing their feelings and opinions freely and emerging of multilateral exchanges, the discussion sessions were held with two different age groups: 18 to 34 years and 35 to 54 years.

As the goal was to yield diversified opinions from the participants, only limited screening criteria were set up based on age and education. The screening questions on job type, agreement on statements of lifestyle and diet preference were to ensure that diverse food choice opinion holders could be recruited in each session. Screening questions of gender and job type were included for demographic understanding. Screening questions asking consumers to describe briefly how their indicated diet preferences impact their shopping habits were used to select out the respondents who were good at articulating and sharing experiences. Given the importance of vocabulary in describing emotions, the measurement of education level was obviously warranted (Barrett, 2004).

A total of 32 consumers participated in the discussions, which were detailed in Table 2.1. Considering the potential sensitivity of the research topic, qualified respondents were contacted in a following up phone call to introduce the discussion topic, the homework they will need to finish before the discussion, and the incentive they will get at the completion of the discussion session. Respondents who were willing to participate in the study were scheduled.

Only one of the qualified respondents refused to participate in the study after the briefing on the study objective. Two asked about how long time it might take to prepare the collage.

The phone interview process was implemented in the recruiting process in Manhattan, Kansas, and it was adapted to questions set up in the survey during the recruiting in Chicago.

2.3.2 Setting

The two groups held in Manhattan, KS, used the facility from Kansas State University Manhattan campus with video and audio recording using Zoom software (Zoom video Communications, Inc., San Jose, CA). The other two groups conducted in Chicago, IL, used the facility from P&K Research with their audio and video system. The focus group moderator had completed training at the RIVA Training Institute (Rockville, MD) and had moderated six discussions before this study. Each participant was provided with name card and suppliers for product grouping activity, such as pencil, marker, blue tape, one set of stimuli cards, and a worksheet (Canson XL Sketch Art Pad, 18"*24"). Purified drinking water was provided for all participants.

2.3.3 Stimuli

Hypothesis in generating stimuli

The intention of using stimuli was to help consumers think more broadly about guilt related perceptions, as one of the primary goals of this study was to identify the product characteristics which may elicit different levels or dimensions of guilt related perceptions. The hypothesis was generated based on market research, consumer trends reports and discussions with the committee members, as summarized in Figure 2.1.

Stimuli and their Presentation

The stimuli list (Table 2.2) was selected to ensure as much as the hypothesis could be tested. Seventeen market products covering categories of Fruit and Vegetables, Meat, Frozen foods, Convenient foods, Beverage, and Snacks were selected. One Spinach crisps snack product de-

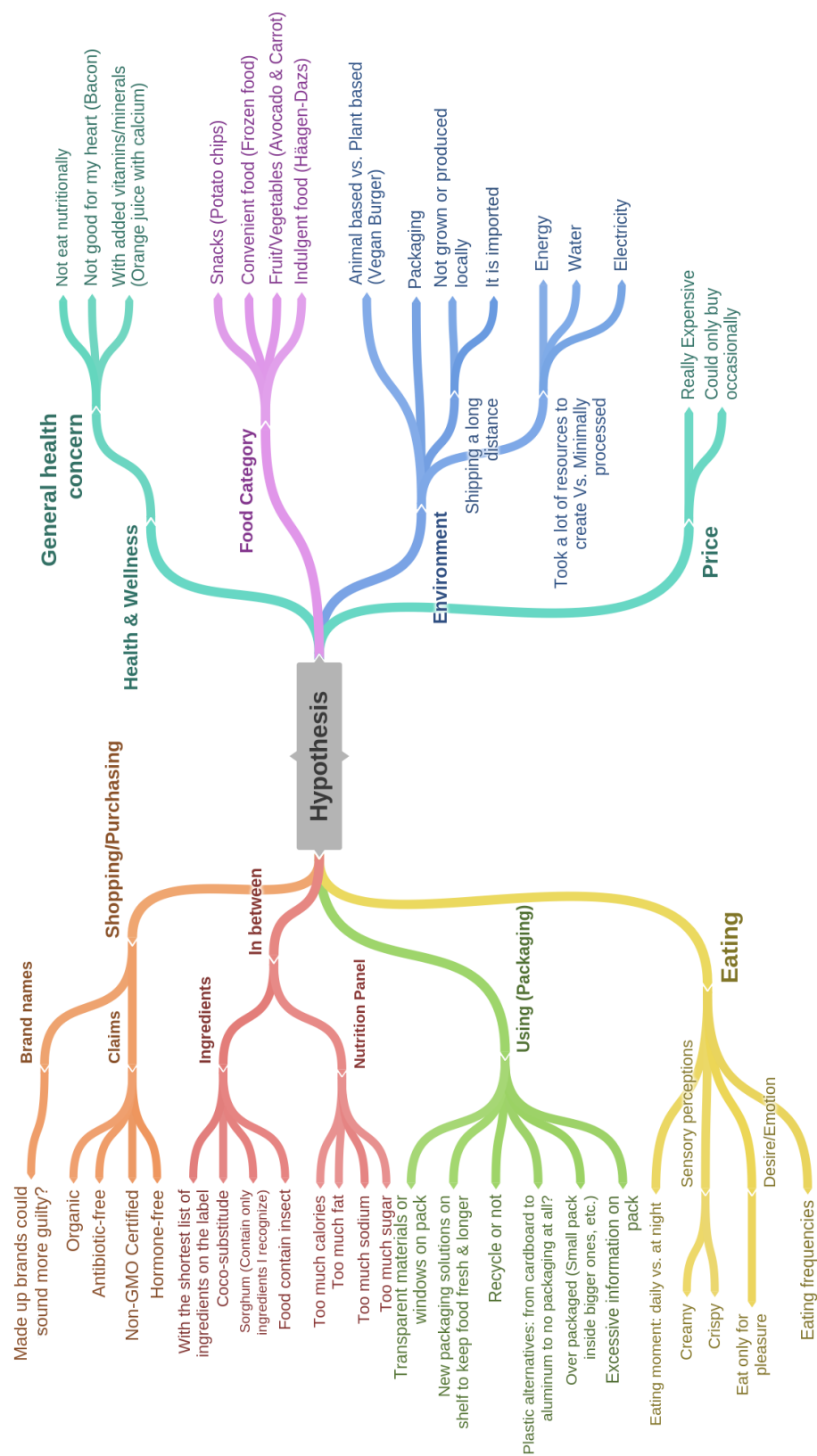


Figure 2.1: Hypothesis of factors could elicit guilt

veloped in a prior study from the center was included as well with a made-up brand name and artwork design. This product was selected for two reasons: a) to validate a prior focus group result, where consumers commented the prototype made them feel "guilt-free" or "less guilt"; and 2, because few existing prepackaged snack products elicited the guilt-free perception. Product cards, including product photos and descriptions about the products (no more than three claims), were prepared and color printed in size of 4.5*3 inch. The claims on the cards were collected either from products' packages or websites. Participants did not taste any products.

Table 2.2: Stimuli List used in focus groups

Photo	Name	Claims	Source
Fruits and vegetables			
	Hass Avo-cado	– No trans fat, cholesterol or sodium – High in unsaturated fats – Help lower blood cholesterol levels	Amazon
	organicgirl Baby Spinach	– Family Size – We washed it 3 times, so you don't have to – 100% Recycled Plastic	Whole foods market
	Fuji Apple	– Fat free – Sodium free	Whole foods market
Meat			
Continued on next page			

Table 2.2 – continued from previous page

Photo	Name	Claims	Source
	Beyond Meat Plant-based Burger Patties	– 20g of Plant Protein per serving – Soy free – Ingredients: Water, Pea Protein Isolate, Expeller-pressed Canola Oil, Refined Coconut Oil, Contains 2% or Less of the Following: Cellulose from Bamboo, Methylcellulose, Potato Starch, Natural Flavor, Maltodextrin, Yeast Extract, Salt, Sunflower Oil, Vegetable Glycerin, Dried Yeast, Gum Arabic, Citrus Extract (To Protect Quality), Ascorbic Acid (To Maintain Color), Beet Juice Extract (For Color), Acetic Acid, Succinic Acid, Modified Food Starch, Annatto (For Color)	Whole foods market
Convenient food, Meat			
	Hormel Black Label Fully Cooked Bacon	– Ready to Eat Bacon – Gluten Free – Shelf Stable	Amazon
Frozen food, Indulgent food			
	Häagen-Dazs Coffee Vanilla Ice cream	– Silky Vanilla Ice Cream – Crispy Belgian Chocolate layers	haagendazs.us
Beverages			
Continued on next page			

Table 2.2 – continued from previous page

Photo	Name	Claims	Source
	Qii Pomegranate Tea	– Guilt-Free, all natural Tea – PH neutral, non acidic – Great for a tooth-friendly late night craving, after-meal refresh, or a pre-meeting confidence booster.	drinkqii.com
	Harmless Coconut Water	– 32 fl oz, \$9.99 – Organic – Fair for life	Whole foods market
	Open Sparkling Water	– US Made = Less shipping Emissions – Just the right amount of bubbles – Aluminum bottles for plastic-free oceans	drinkopenwater.com
	Pepsi Car- bonated Soda	– Refreshing – Delicious	Amazon
Snacks			
Continued on next page			

Table 2.2 – continued from previous page

Photo	Name	Claims	Source
	Lay's Classic Potato Chips	– Made with three ingredients: potatoes, oil and salt – Gluten free – Treats fun to enjoy at lunch, as an after school snack or party refreshment	Amazon
	NutriBug Cricket Protein Bars	– No added sugar or sweetener – 100% gluten free – 10% quality protein	nutribug.com
	Quinn Snacks Pretzels deli rye style	– Whole Grain – First ingredient is sorghum – Farm to Bag promise	Amazon
	Dang Bar Cardamom Chai	– High fat, Moderate Protein, Low Carb Snack Bar – Healthy Plant-based fats from Coconut, Cocoa butter and almond butter – Ideal for Ketogenic, Low Carb, Low sugar diets	dangfoods.com
Continued on next page			

Table 2.2 – continued from previous page

Photo	Name	Claims	Source
	The New Primal Gin- ger Honey Turkey Jerky	– Pasture raised turkey used – Soy free and Preservative Free – Paleo certified – No Nitrites or Nitrates added	thrivemarket. com
	Skinny Pop White Cheddar Popcorn	– No Artificial ingredients – Non GMO – Gluten Free	Whole foods market
	meiji The Chocolate	– Comfort Bitter – Deep Nutty taste – Bean to Bar	meiji
	Delightful Garden Spinach Crisps	– Calories per serving size (30g): 110 Kcal – Made with 52% fresh baby spinach and all other organic ingredients	Internal source

2.3.4 Overall FGD Procedure Design

Homework

One week before the discussion session, detailed homework instruction was sent to participants by email (see Appendix.B). Overall, consumers were required to think about food and beverage products, which products make them feel guilty when they have purchased, prepared, or used them. Which products make them feel less guilt? On the opposite, which products could make them feel no guilt or feel good. Scheduled participants were asked to prepare a collage with pictures taken from internet printouts, magazines, newspapers, drawings, or sketches, to illustrate the above question. Pictures could represent the products, their emotions, feelings, or their state of mind. A hard copy of the homework was requested to bring to the discussion session.

Discussion flow in focus groups

The discussion procedure included five steps (Figure 2.2), it started with introducing the discussion plan, a facility set up, and the ground rules that participants were expected to follow. Next, built up a rapport by asking each participant to introduce their name, their favorite foods, that they eat very often or only occasionally. Then, participants were invited to introduce the photos of the products they collected from homework that made them feel guilty, sort of guilt, or good/guilt-free and explain the reason that made them feel that way. The discussion started from talking about the homework but was not limited to it; as a follow up, participants were asked to do an individual sorting task on 18 product cards.

The sorting task requested subjects to place the "similar" product cards together and to separate "dissimilar" ones based on the different guilt perceptions they may have, then describe the groups they have partitioned. To make the task easier, consumers were asked to group the cards on a worksheet (18*24 in). Respondents were told they could use any criteria for separating the products that made sense to them. This grouping task was designed in a way that could be simple and easy for respondents to implement. With limited timing planned for the discussion, no extra practice or trial was given. Following the sorting activity, probing was focused on

understanding how consumers made their decision in the grouping, and what made them feel that way. The detailed discussion guide was in Appendix.C.

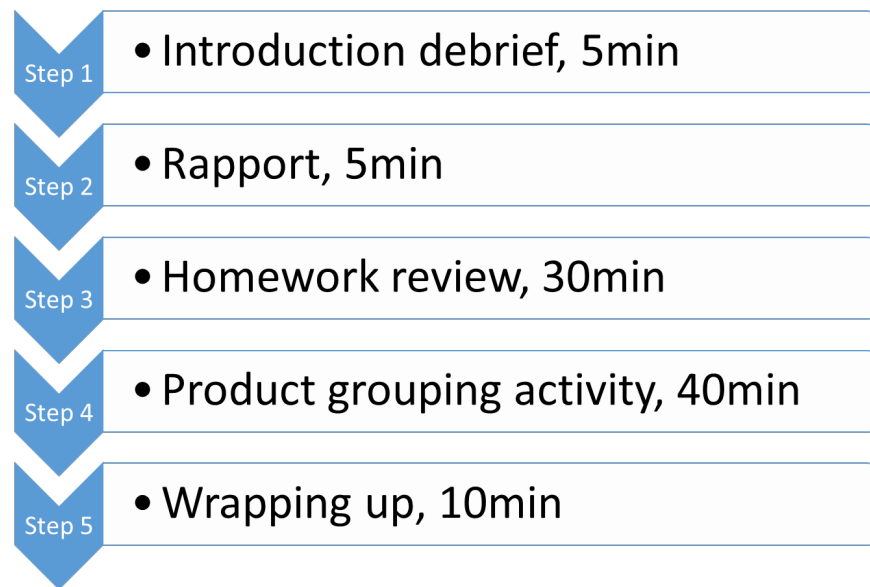


Figure 2.2: Discussion flow in focus groups

2.3.5 Analysis

FGD fieldwork was video recorded, and transcripts were summarized immediately after each discussion session.

Mainly qualitative information was yielded addressing the above questions. Data were analyzed using the Constant comparison analysis summarized by (Onwuegbuzie et al., 2009): coded the data units, grouped the codes in categories, developed themes expressing the content of groups.

Multiple Correspondence Analysis (MCA) was applied first on raw sorting data, which contained 18 rows and 32 columns, to understand the grouping pattern of products, as it is a principal component method dedicated to qualitative variables (Abdi and Valentin, 2007). MCA provides a representation of the product space, which would reflect similarities and differences perceived by all subjects, therefore, making it possible to shed light on how the products were perceived and get insights into consumer choice and behavior (Cariou and Qannari, 2018; Lê

and Worch, 2014), `fast()` function from `SensoMineR` package in R version 3.6.2 (R Core Team, Vienna, Austria) was used to perform the analysis (Cadoret et al., 2009).

Once the sorting task was completed, assessors were asked to provide descriptive words for each of the groups they formed (Varela and Ares, 2012). The textual data were important as they indicate the most significant criteria to consumers in differentiating the objects. The textual data were transformed into a contingency table where products were placed in rows, and the different words used to describe them were in columns, before being submitted to Correspondence Analysis (CA), making it possible to add another layer of valuable descriptive information on the product space (Lê and Worch, 2014). Before data were transformed, words were combined (e.g., from "No guilt" to "No_guilt") and regrouped ("Healthy choice" was grouped with "Healthy"). This process was completed with two other colleagues, and words were only regrouped when agreement achieved among everybody. Only words whose total frequency was higher (or equal) than five were selected in building the contingency table. Correspondence Analysis was then applied by using the `CA()` function from the `FactoMineR` package in R.

2.4 Results & Discussion

2.4.1 Factors that could elicit guilt related perceptions

Overall, effective hypothesis in generating stimuli list was achieved. Categorization of the factors which could elicit the guilt related perceptions was inspired by the food choice model (Köster, 2009). Factors identified were summarized into four main big categories: Intrinsic product characteristics (Figure 2.3), Extrinsic product characteristics (Figure 2.4), Situational factors (Figure 2.5) and Social Cultural factors (Figure 2.6).

Intrinsic product characteristics

As shown in Figure 2.3, a relatively more straightforward consensus was achieved on the intrinsic product characteristics that could elicit guilt related perceptions. It included three sub-

Intrinsic product characteristics												
Sub-category	Nutritional values				Food Categories				Sensory			
Factor	Fat content	Sugar content	Carbohydrates (High calorie)	Not eat Nutrition ally	Fresh fruits & vegetables	Water	Snacks	Convenient food	Fast food	Processed food (Sodium & colorings)	Greasy	Thickness
Food or occasion example	Bacon Potato chips Fried chicken Dressing on salad Pistachios, Cashews	Starbucks liquids Soda Chocolate Ice cream	Bread Pasta pizza	Food in general Unhealthy fast food Kids brand chicken nuggets	Avocados Watermelon	Water Green tea	Potato chips Ice creams Candies or sweet treats	Lunchables Chemicals and preservatives in Packaged meals	Associated with high sugar, high fat	Potato chips Ice creams Soda Associated with high sugar, fat, sodium	Baked vs. fried potato chips Roasted vs. fried chicken	Thin crust pizza vs. thicker crust pizza
Feelings	Guilt, sort of guilt Feel lazy, unproductive, unhealthy, blowing vs. happier, healthier, energetic, productive Disagreement existed for high carbs (healthy vs. gross) and Ice cream (No guilt vs. guilty)				Feel good Guilt free May or may not enjoy		Guilt, sort of guilt, pleasure Feel tricked, less flexible, wasteful for processed food				Less guilt	

Figure 2.3: Intrinsic product characteristics could elicit guilt determined via focus groups

categories: Nutritional values, Food categories, and Sensory perceptions. It was not surprising that nutritional concerns accounted for as a significant contribution to guilt or sort of guilt perceptions, primarily due to concerns on high fat, high sugar, and general concerns about not eating nutritionally.

- Nutritional Values

The first factor that came out from the discussions was high-fat content from bacon, potato chips, fried chicken, which made participants feel guilty — furthermore, some guilt on eating pistachios, cashews, and the dressings on a salad. Participants' intention of controlling eating frequency and the amount of intake ("I try to limit the amount of bacon I eat, I try to limit it to a couple of times a month. I only eat one or two strips"), occasions ("If I crave bacon, I will eat it, so that I do not crash and eat a bunch at one time, but only for breakfast"), locations ("I only eat bacon at restaurant") were expressed to address how guilt related perceptions might impact on their food eating behaviors.

High sugar content could generate polarized guilt perceptions from no guilt (enjoy or not necessary) to guilt. Concerns about the amount of sugar consumed every day were expressed. It was said that mentally and physically, consumers felt worse if they consume many sugars. When talking about regular soda, consensus achieved, as everybody felt guilty drinking it ("I do not drink soda, it makes me feel blowing."; "Emotionally it is refreshing, but guilty knowing how much sugar in it."), although some consumers did enjoy it ("Soda, in general, makes me feel guilty, but it is something I enjoy. Because it is doing nothing for you positively, except that the taste is good"). Regarding chocolates, especially dark chocolates, different opinions existed. Some participants considered they were guilty of eating, as they were still candy bars. Others categorized dark chocolates as no guilt to eat but not necessarily because they were healthier, better for you with less sugar (compared to milk chocolate), and not always necessary because they were snacks. Guilt perceptions on sugary products had potential impact on consumers' lifestyle ("I have to work out after consumption to work off the food"), their shopping behavior ("Normally I don't buy a lot of sugary products in groceries, they are not in the list. But then I crave it, I end up buying them.") and eating/drinking behaviors ("Second thought told me I

should not drink the whole bottle or whole can, to make it less guilty").

Disagreement existed regarding food contain high carbohydrates (bread, pasta, pizza): some consumers felt gross eating high carbohydrates, as they associated it with high calorie, others thought oppositely considering it was healthy due to the energy it could provide to their body. It could impact their food choice ("I intend to eat complex carbohydrates.") and eating frequency ("I love pizza, I could eat it every day. But I do not eat it very often, as it is just too much fat and calories to eat every day.").

Judgment on the nutritional values of each product was one criterion used by many participants for their food choice. Not eating nutritionally was one of the factors that could elicit some guilt or guilt perceptions. Fast food, in general, could elicit some guilt ("I feel guiltier when I go out to eat versus eating at home because fast food seems to be less healthy. Since I have paid for this meal, so I need to finish it all.").

- Food Categories

Consumers expressed diversified opinions on the snack category, but not really for the other factors under sub-categories of the food category. Almost all consumers agreed that water, green tea ("I drink much water. I feel no guilt because it is good for you. Tea as well"), fresh fruits and vegetables ("No matter about moderation. I could eat a whole lot of watermelons and not feel guilty. I know it has lots of sugar, but it is natural") made them feel good, and they felt no guilt eating them no matter of the quantity of the intake. Consumers' feedback on avocado showed that it just made them feel good eating avocado because it was natural ("Avocado, I know it has fats but its good fat, I eat it nearly every day, and it makes me feel good"). Although some of the consumers mentioned, they did not enjoy eating fresh vegetables. Overall, it made them feel happy, healthy, energetic, and productive, compared to the feelings of lazy, unproductive, and unhealthy related to eat something processed.

In more than two groups, consumers associated fast food and processed food to high sugar, high fat, high sodium, which made them feel guilty of eating them, as well as the preservatives and the chemicals that might be added in the convenient food and prepackaged meals. Especially the coloring added in processed foods, made them feel being tricked buying something

looked away from it was naturally.

Different opinions were given regarding the snack category, together with the potential impact on eating and purchase behaviors: Some participants expressed feel guilty for eating potato chips and ice creams, said they rarely eat them. Others mentioned they would not buy potato chips by themselves but would eat if it was available. Some consumers would have a small amount of ice cream at the end of the day to make themselves feel great, as a reward. On the opposite, some participants felt no guilt eating ice cream no matter of moderation ("I feel like ice cream is the only thing I could feel indulgent and not feel guilty") and claimed enjoyed it.

- Sensory

Sensory could elicit different guilt perceptions as well. Baked fried potato made delivered less guilt perception compared to eating fried potato chips, due to the less greasy perceived in the mouth. A similar example was given in another group for roasted and fried chicken. Texture perception of thickness could elicit discriminating guilt perceptions between a thin pizza crust and thicker ones ("I like thin crust pizza. I feel a little bit guilty about it, but I do not feel as guilty as a thicker crust pizza.").

Extrinsic product characteristics

Diversified opinions were collected regarding extrinsic product characteristics as well. As summarized in Figure 2.4, it included four sub-categories: ingredients, claims on packages, price, and product name, which could elicit guilt perceptions.

- Ingredients

An ingredient that can not be recognized, pronounced, and a lengthy list of ingredients made consumers feel guilty to eat them, as they did not know what they are, whether they were good or not for them. Therefore, consumers were hesitating to put those in their bodies. A long list of ingredients was associated with over-processed, which made consumers feel guilty about eating. Consumers were describing that they have never heard about the first ingredient (sorghum

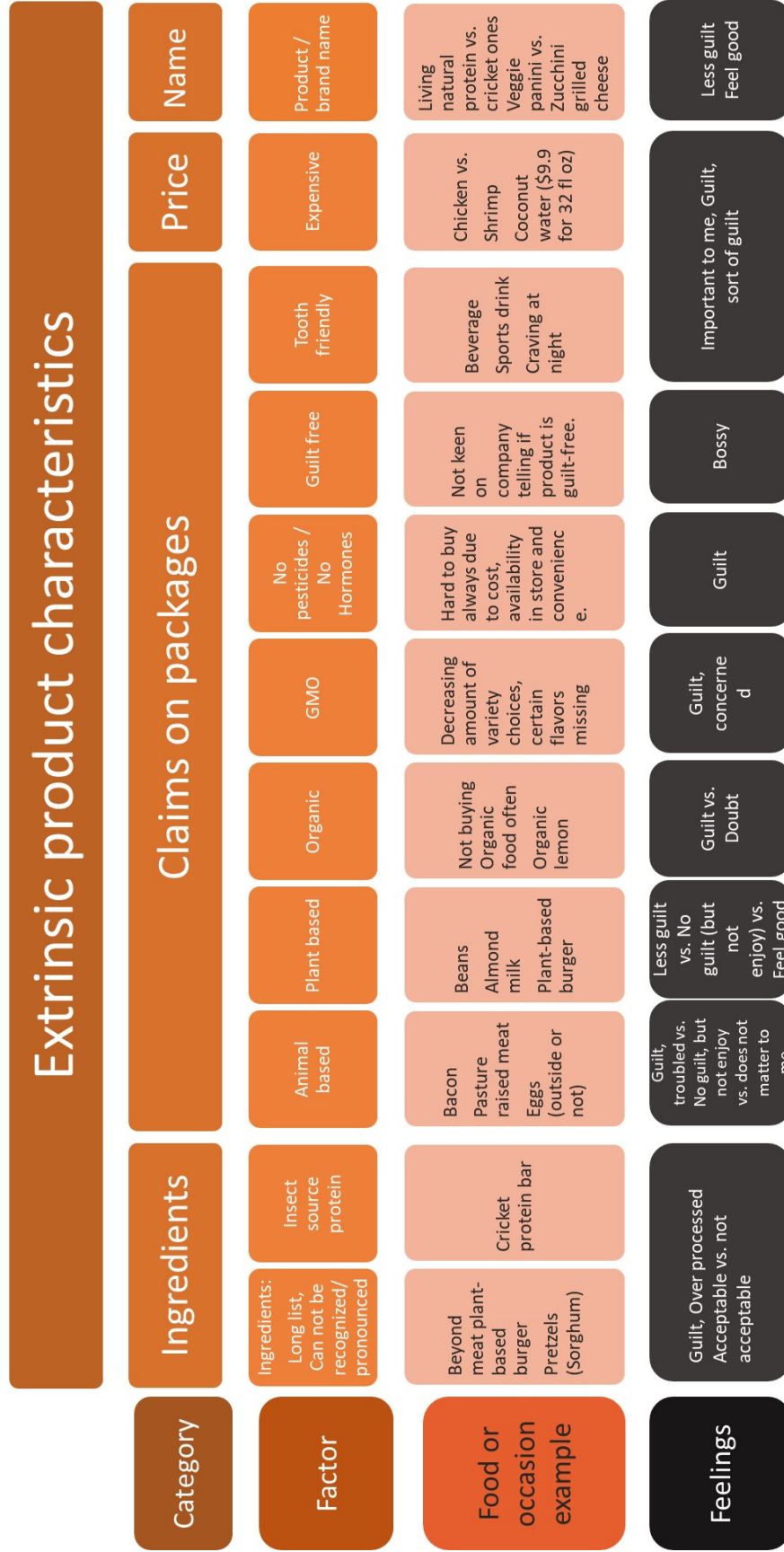


Figure 2.4: Extrinsic product characteristics could elicit guilt determined via focus groups

) from the pretzels. They believed people saying "do not eat the food they can not pronounce the name". That led them to decide that they would not buy the pretzel product in the store. Another example was the Beyond Meat plant-based burger. The long ingredient list made the consumer feel guilty again because they do not know what is in it. They would be willing to make their veggie burger at home.

- Claims on package

Claims on packaging accounted as a large sub-category led to a different level of guilt perceptions mixed with other feelings. Take animal-based products as examples: some participants expressed that animal-based products made them feel guilty, especially ones from commercial farming, because they loved animals. It would impact their food choice behaviors: some of them tried to seek for sustainably raised meat with affordable price, some participants said they would choose only vegan or vegetarian meat substitute or egg, others could not understand what was wrong of eating meat and expressed no guilt eating it at all. Other examples were related to how meat products were produced (how animal was raised, sustainably, or not). Again, this might not be a concern to some consumers. Pasture-raised animals were important to some consumers. As one consumer from Chicago groups mentioned: "when I saw a package of eggs, said they are outside, they got to see the sun, that was how it got produced. However, it was \$4 compared to normal eggs, which was one dollar. I feel guilty buying that one dollar one. I want the 4 dollar one, but I can not afford this." One practice shared was to buy eggs from her friends who had chickens so she would know where they come from and how they got fed. It seemed that nowadays, young consumers were educated on how animals were treated, from start to finish. Nevertheless, due to the high price, they were left with the decision that they could do what they could afford.

The claim of plant-based generally made consumers feel good, and the examples given were beans and almond milk. One strategy shared was using almond milk for making coffee ("Although compared to milk, almond milk has a different flavor. However, it is thicker, dense, which can help keep the filling longer than adding creamer or milk. So no need to have a late morning snack in that way"). Disagreement existed on whether enjoying almond milk,

but generally, consumers agreed that it was healthier. Quite some discussions happened on the plant-based burger. Meat lovers considered it no guilt eating meat because they ate much meat, knowing they were not from animals, and they were not killing animals made them feel no guilt to eat. Some respondents felt less guilt and expressed the willingness to try the Beyond Meat plant-based burger. One participant expressed he had tried many meat alternatives, but most of them were frozen products, not a refrigerated one that could make by themselves. He thought it was less processed if it was a refrigerated product instead of a frozen one. Intense feelings regarding the long ingredients list from Beyond meat plant-based burger were collected, participants either felt guilty or questionable on it. It made them feel that they were put chemicals in their bodies, even though it was plant-based.

Claim on Organic could elicit either guilt ("I feel guilty if I did not buy organic that often because I saw much irresponsibility in our land, things like all the bees are dying.") or doubt ("I do not think Organic is necessary. Sometimes, I do like some of the organic choices, but you are paying more, and are you paying for it? So I go back and forth that way as a consumer, because the idea is excellent, but are you getting it?").

GMOs could lead to guilt perceptions as well because consumers were concerned with the fact that they were having a decreasing amount of a variety of choices. "Many traditions or certain flavors were blocked or disappeared. More things become more uniformed". It seemed that Non-GMO is vital to consumers, but they would not buy the food all the time Non-GMO". As introduced, what they were doing was to be aware of it, trying to stay away from it and realizing there was something they can not avoid buying that was genetically modified. "It will not be something always in my mind, but it will be something I will think about". Some consumers claimed that they would not accept (buy) a GMO fish at all or any GMO meat.

Respondents did not like companies directly communicating that their products were guilt-free on the package, as it made them feel bossy. A claim of tooth-friendly was considered essential to some consumers, which made them feel no guilt to drink in the evening. As they knew if they had consumed it in the evening, it would not cause teeth harm.

Many of the factors identified in this category mixed with the others. One of the parent consumers expressed how hard she had tried not to buy things that have pesticides or hormones.

However, it did not always work. The cost was certainly an issue, as it was always more expensive. Availability was part of it, too. Unlike the grocery stores were doing a good job keeping multiple varieties, lots of the farmers market only had limited choices. Another part is about convenience. For example, If they would like to buy something for beef stew, they would want to buy a pre-chopped pack instead of a steak and chop by themselves.

- Price

Price, especially high cost, could generate guilt and sort of guilt perceptions. Participants mentioned that they felt good about the chicken because it was cheap compared to other meat or seafood (shrimp). This mattered with their eating frequency, as several consumers said they like shrimp, but only do it less frequently because of the cost. It was the same for buying fancy coffees from coffee stores; they could only do occasionally because they were expensive. During the product grouping task, several consumers placed the coconut water in less guilt group, due to its price, as they would have a hard time spending \$10 on 32 fl oz coconut water.

- Name

Different product names might either make consumers feel less guilt or feel good. As the responses from Manhattan showed that they would like to try insect source protein products, but they considered a different name of the product could make them feel less guilt or good, for example, calling it living natural protein instead of insect protein. One consumer shared that when she made zucchini grilled cheese for her husband, she did not call it that way. Because her husband was not a big fan of zucchini. Therefore, she named it veggie panini, which sounded like an appetizing from Italy.

Situational factors

Another big category of the factors were situational ones, as summarized in Figure 2.5, which included three sub-categories: Efforts before eating or drinking, eating or drinking, using or packaging. Same as the extrinsic product characteristics, diversified feelings might be elicited

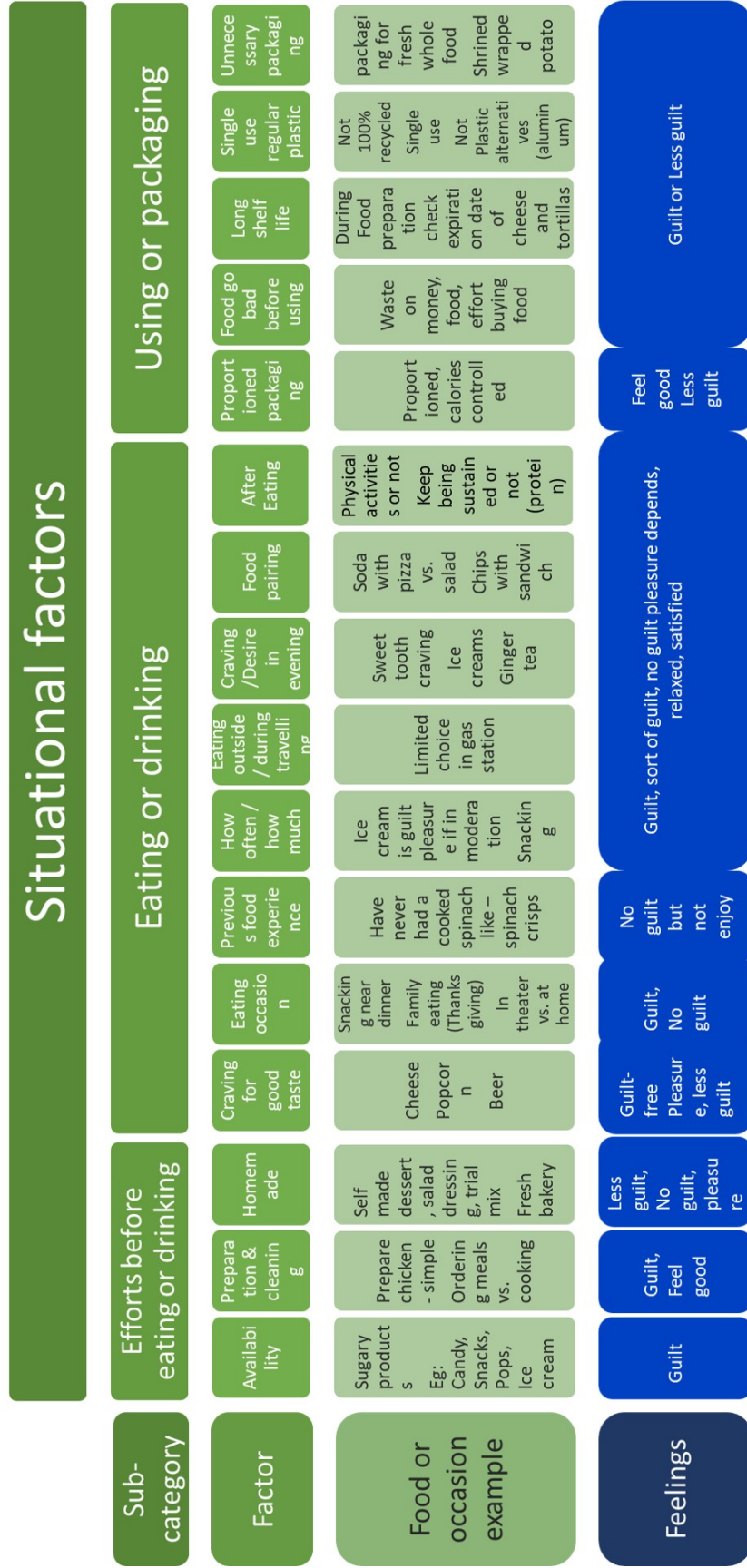


Figure 2.5: Situational factors could elicit guilt determined via focus groups

together with guilt. Many of the factors listed here worked together with the others as well, and led to a different degree of guilt perceptions, or worked oppositely by making consumers feel good. Mixed feelings included pleasure, enjoyment or not, tricked, wasteful, released, relaxed, satisfied. The prior food experience was listed under the Eating and drinking category in this study. However, (Köster, 2009) listed it under Psychological factors and expressed it as previous experiences learning.

- Efforts before eating or drinking

The availability of sugary products (Candy, Donuts, Ice cream, Pops) and potato chips could make consumers feel guilty, which was one example showing multiple factors mixed in eliciting guilt. As introduced, "there are always donuts in the workplace, all over the place. So convenient to eat and grab a coffee". The availability of candy in the office room from coworkers at the desk was another example shared. Except for availability in the office, it applied to have ice cream, other snacks, and beverages at home. "You open the freezer, there it is, ice cream. Although I try to cut back sugar, however, it is tough to do", "My husband also purchases groceries, but he buys pops, and chips and sparkling water, so if I see him consuming them, I will try as well".

In addition to feeling guilty when eating something one should not eat, ordering food instead of cooking for meal occasions was another situation identified could elicit guilt. "Sometimes, I just have that urge to have something delivered, not have to make anything. But it is usually poor quality food, not healthy choices. Then, I think to myself, I have perfectly good food in the fridge I could have taken time to make. Why didn't I. Always regretted after I ate or it is done".

Depending on the efforts consumers spend time in preparing food and cleaning up later, they might or might not feel good "Chicken makes me feel good, I can make a lot of it at once. It is simple and easy".

The idea of "Homemade", either for dessert, salad dress, trail mix, or bakery, could make consumers feel from no guilt to sort of guilt. Self-made dessert was said could make consumers feel sort of guilt because they could make their own desert and can put whatever they want in it. They felt less guilty because consumers could feel they are in control, a little bit guilty but

not as much. Several consumers mentioned that knowing they were in control with homemade food was important because they would know exactly what was in the food ("I like to make my trail mix, so I know what is in it"), as well as they could add whatever ingredients they want ("I eat a lot of trail mix with dark chocolate, blueberries, raisins with lots of nuts and sunflower seeds, I make my trail mix. So I always get what I want"). Self made dressing with no oils added was described could make consumer feel better about the salad they are eating. "Because I could just use lemon, salt, pepper, some herbs, no oils. There will be only a little bit of oils, which will not increase the calories I will intake." Fresh homemade bakery which might be not nutritionally valuable could make consumers feel sort of guilt, but it could bring pleasure due to the texture when they were just out of the oven ("Chocolate cookies, I like the chocolate to be gooey when they are still warm").

- Eating or drinking

Multiple factors were identified in eating and drinking occasions that could elicit guilt-free or less guilt perceptions. Craving for good taste or pleasure was one factor under this sub-category. Craving for pleasure could make consumers feel less guilt: "I know it is not great for me, make me feel a lot of guilty, but better than eating something I do not like very much. Same for drinking beers: "It is not good for you, but it is something you will enjoy. That makes me feel less guilty".

Craving or desire in the evening was another factor that could make consumers feel either satisfied, relaxed, or some guilt, less guilt. Multiple consumers mentioned they had had a craving in the evening, either for ginger tea to help relax or a wicked sweet tooth craving after eating healthy throughout the entire day. Different practices were shared to meet their cravings at night. One consumer mentioned she would eat one dove chocolate, like a special treat to herself each night ("I want to have more, but I told myself I can only do one. I feel great when I am eating it"). Going with a relatively healthier option, for example, Halo Top ice cream with less calorie was another practice to make consumers feel less guilt: "It is slightly different from regular ice cream with a harder texture, but generally it gives you the same experience as eating a bowl of ice cream. I would say I still feel some guilt. Because at the end of the night, I usually

have the bowl of my halo top. I am still asking myself, do I still need to eat this? But it is less guilt, compared to having a regular ice cream I would eat previously".

Through the sorting task, the Delightful Garden Spinach crisps were categorized into the group of "Guilt-free but not enjoy" by one consumer. As the consumer considered, he has never had cooked spinach he liked, even though he did like raw spinach very much. This led to another factor of previous food eating experience that could impact on the generation of guilt related perceptions.

Depending on how much or how often consumers had bacon, potato chips, ice cream, it could either make consumers feel guilty or guilty pleasure. As pointed by one consumer, the ice cream was a guilty pleasure, as long as it was in moderation. This would potentially impact their eating and shopping behavior by eating only occasionally or not buying very often.

Eating outside, especially during traveling, could make consumers feel guilty as well because minimal healthy options could be found in the gas station.

Different eating occasions could make consumers feel oppositely in terms of guilt perceptions; these factors were identified by talking to consumers in Chicago. For example, eating a snack close to dinner time would make them feel guilty. On the other hand, eating together with family, such as during Thanksgiving dinner, would never make them feel guilty, although the dinner might not necessarily be healthier. Depending on if consumers were eating for a special occasion, for example, seeing movies in theater versus just eating at home, contrasting guilt feelings came out: As one consumer introduced: "If I were going out to the movies with my husband in one night and I want to have a big bowl of popcorn pops. I would not feel guilty because it is part of the experience". On the opposite, if consumers were at home in the mid-afternoon and decided to take a giant bag of caramel M&M. That will make them feel terrible: "As there would be no reason for it. It was not enhancing an experience. It is just a waste of eating something like that".

Food pairing examples that were shared led to polarized guilt perceptions: no guilt ("I do not think it is guilty to have Coke go with pizza. However, if I have a Coke with salad, I told myself it is not making sense. Coke and hamburger also go well together. Furthermore, for salad, I should have water."). Similarly, a small bag of chips was considered matching with a sandwich:

"If I am going to eat a sandwich, I will have it with a bag of chips. I would not feel bad about that because it tastes great. The texture of chips and sandwich, it is just great, to have soft bread and crunchy chips. Sometimes, you could have small bags of chips, so it will not get too crazy".

Some guilt perceptions could be elicited after eating. Depending on if consumers would do any physical activities, they might feel guilty or no guilt after eating. It did not matter to how much they have eaten ("On the days I run, I do not feel guilty eat anything. For the days I do not run, I feel guilty of eating anything."). During the sorting task, the Dang bar was sorted into no guilt group, as some consumers considered it has a lot of protein, which could keep them not hungry throughout the day. So they would not crash in work, being sustained. This was important to them because if consumers get hungry, they might eat a lot.

- Using or Packaging

Using or packaging was another sub-category under Situational factors identified could elicit guilt related perceptions. Even though consumers expressed, they were trying to stay away from lots of processed stuff. Pre-portioned, calories controlled snacks were considered to make consumers feel better. One example given was those claimed 100 calories snacks: "Because I know it is 100 calories. That gives me that sweet, salty, crunchy, without overindulging as an M&M. Even though it is probably a concept, I feel less guilty about it. Because I know it is a certain amount, certain calories, that I will get from it." A similar opinion was obtained when talking about the Homemade idea.

Factors that could elicit guilt perceptions related to food was not limited to consumers' poor food choice, eating unhealthy, or something dangerous. A lot of the time, people might assume only nutrition aspects led to guilt. Finding that the food going bad before they could be used or eaten could make consumers feel guilty as well, as it made them feel a waste of money, food, as well as the effort buying the food. One concrete example was shared: "Sometimes, I feel guilty, I do not get around to turn the apples into apple sauce before they were going bad". This could impact consumers' shopping behavior: "If I need seven olives for a recipe, I only buy enough for me because my husband does not eat them. I went to the olive bar and only buying seven pieces. I do not have to buy a whole jar and sit them in the fridge".

Finding out the long shelf life of the food (such as tortillas, cheese) during preparation might generate guilt perceptions. What confused consumers were that they were not sure what on earth has been put in the food to make them last so many months. Therefore, they were worrying, "Is it good for my health? Is the stuff added harmful to me? All these preservatives and so many additives." It led some consumers only to want to shop in the farmer's market. So they could at least know they are getting something straight from the source.

Several consumer trend reports showed that it had reached a summit for consumers' consciousness of plastic using, harming the ocean ([Euromonitor International, 2019, 2020](#)). During the sorting task, some consumers group organicgirl Spinach (100% recycled plastics) and Sparkling water (aluminum package) into no guilt group; it was packaging that had partially driven their attention in making the group. As explained by one consumer, this was important as he would know the packaging would not end up in the land or killing the animals in the ocean. However, after clarification this would not directly impact on consumers purchase behavior. For example, consumer would not buy something just because it was made of recyclable materials. But if it was something on their shopping list, and saying it was recyclable, this would make them feel better about buying it. Another considering was price, it seemed that if same price, consumers would be more willing to buy the product with a 100% recyclable package than the other not recyclable one. What is more, some consumers realized it was not just about using plastic, but its single-use. Another reason that makes consumers feel less guilty using plastic alternative was because they did not need to worry about reading the labeling looking if they are BPA-free.

Unnecessary packaging on veggies and fruits could make consumers feel guilty as well. Buying fresh veggies and fruits with plastic packages elicited guilt. One example was shrined wrapped potato, consumers were confused about its necessity.

Socio-cultural factors

The 4th category of Socio-cultural factors was summarized in Figure 2.6 and included three subcategories: Society/Community, Strategy, and Belief.



Figure 2.6: Social cultural factors could elicit guilt determined via focus groups

- Society/Community

Knowing that they were supporting the local community and the smaller business was important to consumers as this could make them feel good. Participants expressed that depending on the item (such as meat), if, given the choice of getting something local or imported, they would go for the local option. It made them feel not only they were helping their community but also the economic local systems. This could impact their purchase behavior; as one consumer mentioned, he tried to buy smaller meat packers. The other consumer said that shopping in big grocery stores (Walmart) allowed him to get stuff cheaper; however, knowing that many people went out of business due to that made him feel guilty.

Social pressure on buying or eating unhealthy food, not buying organic food could make consumers feel guilty, as lots of their friends might go with vegan, organic, or gluten-free options.

- Strategies

It was inspiring to see how consumers leverage different strategies to make themselves feel good, indicating how this perception was important for them. For example, smartly balancing their calories between food and drink categories by drinking only plain tea to save calories for food intake. Ensuring the balance of protein intakes with overall calorie was another practice that had been shared multiple times. Consuming bars with a good amount of protein but limited amounts of sugar (calories) made them feel no guilt; what's more, it motivated them to work out, feel energized. Halo Top Ice creams were talked about again here, due to its balance of 20g proteins, with only 280 calories. A consumer could clearly remember all the nutrients content and thought it a perfect ratio. "20g proteins that are many proteins, unless drinking a protein shake with water, it is not going to find that amount of protein with that low amounts of calories, especially in a dessert. Eating a whole bowl of it will not make him feel guilty." Another strategy shared is choosing kids brand chicken nuggets containing invisible vegetables, which could be more nutritious than regular ones.

- Belief

Need state was another factor defined under Belief elicited guilt related perceptions. Some consumers expressed they do not need plant-based meat; therefore, imitation meat was not something they would try or buy. This led them to place the Beyond meat plant-based burger into a sort of guilt during the sorting task.

Overall, the discussions with consumers from two locations added the validity and breadth of the consumer input, which was vital at this stage for factors identification.

In short, a total of 45 factors covering four categories were identified that could elicit guilt related perceptions.

Guilt related perceptions might be more complicated feelings

Diversified discriminants were identified that could elicit Guilt related perceptions. Among them, it has been primarily agreed that guilt perceptions would come in when eating or drinking food with specific characteristics, such as high fat, high sugar, high calorie, and no nutritional benefits in general. Most of the time, fast food and processed foods were associated with such characteristics, together with other chemicals or preservatives in eliciting Guilt. Moreover, eating or purchasing food with a long list of ingredients or not buying organic and Non-GMO could make consumers feel guilty. Guilt perception would not just be elicited because they eat or drink too much or too often. It has been held as a belief impact on consumers' eating and drinking behavior, food choice, shopping behavior, and life living. In other words, this provided evidence showing categorizing guilt perception under one aspect of emotion responded to certain stimuli, maybe not enough, as evidence collected from the discussions showing that it could be considered as a particular belief or feeling.

Potential impact of guilt on food choice and eating behaviors

Figure 2.7 summarized the potential impact of guilt perceptions related to food. It has been shown that guilt could impact consumers' eating and drinking behaviors in multiple ways, such as the amount of intake, frequency, occasions (late night, special moments), location (home or restaurant), cook from scratch or not, name the food differently to feel better, etc. Guilt related

perceptions could lead a consumer to make healthier food options as well as sustainable food choices, like choosing to eat a popsicle instead of ice cream, choosing vegan or vegetarian meat substitutes, avoiding single-use plastic and unnecessary packaging, etc. With more researches showing consumers' trend of seeking healthy and sustainable food choices (Aschemann-Witzel, 2015; Marchi et al., 2019), this study provides evidence that guilt perceptions could motivate healthy eating. Guilt related perceptions mattered with consumers' shopping behavior in terms of purchase decision making, frequency, amount to purchase, and the choice of shopping location. Working out to feel less guilty was one practice showing guilt perceptions' impact on life living.



Figure 2.7: Impact of guilt with respect to food

2.4.2 Products Categorization

Results from the sorting task analysis showed that guilt related perceptions could be potential in differentiating products, implying the importance of identifying product characteristics elicit guilt.

Initial Examination on strategies used in the individual sorting task

Overall, consumers generated 2 to 4 groups, 88% of the consumers either generated 3 or 4 groups (Figure 2.8), with each group composed of 1 to 13 products (Figure 2.9). Figs. 2.10 to 2.12 were shown as individual grouping examples completed by consumers, generating 2 to 4 groups of products based on the different guilt perceptions they had.

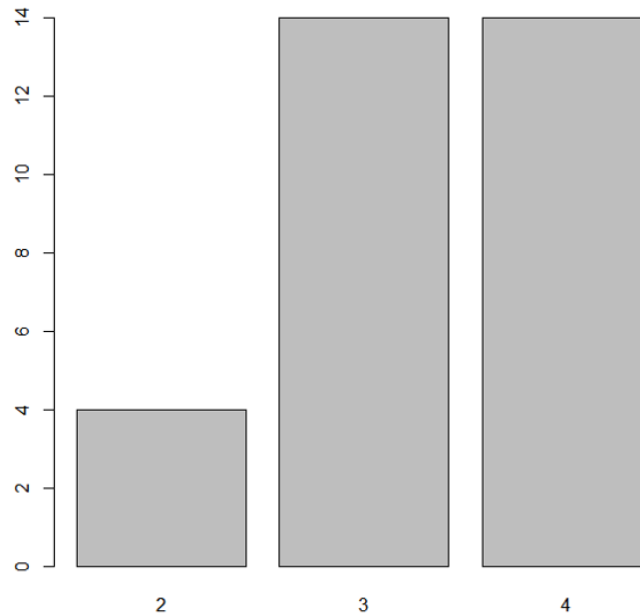


Figure 2.8: Number of groups formed from the Sorting task

Representation of the products space

In this section, a representation of the product space that could reflect the similarities and the differences perceived by the consumers were expected to be delivered.

The output of the co-occurrences matrix was checked first to provide an initial examination of the grouping strategy used by the consumers. The co-occurrences matrix (Figure 2.13) was showing that some products (colored green or light green) were more often grouped together versus some that never or rarely were grouped together (colored with red or light red). More than 80% of the times, the Fuji Apple, organicgirl Baby Spinach, and Hass Avocado were grouped together. Similarly, Häagen-Dazs Ice Cream, Lay's potato chips were grouped together

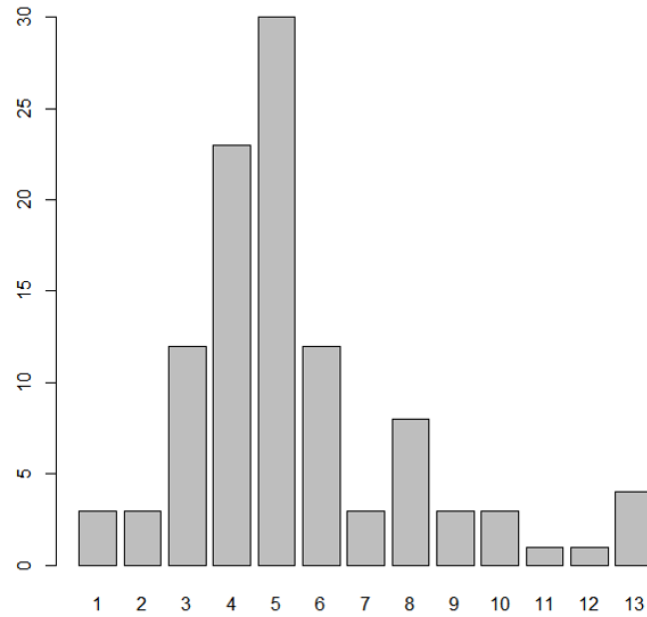


Figure 2.9: Number of products per group in Sorting task

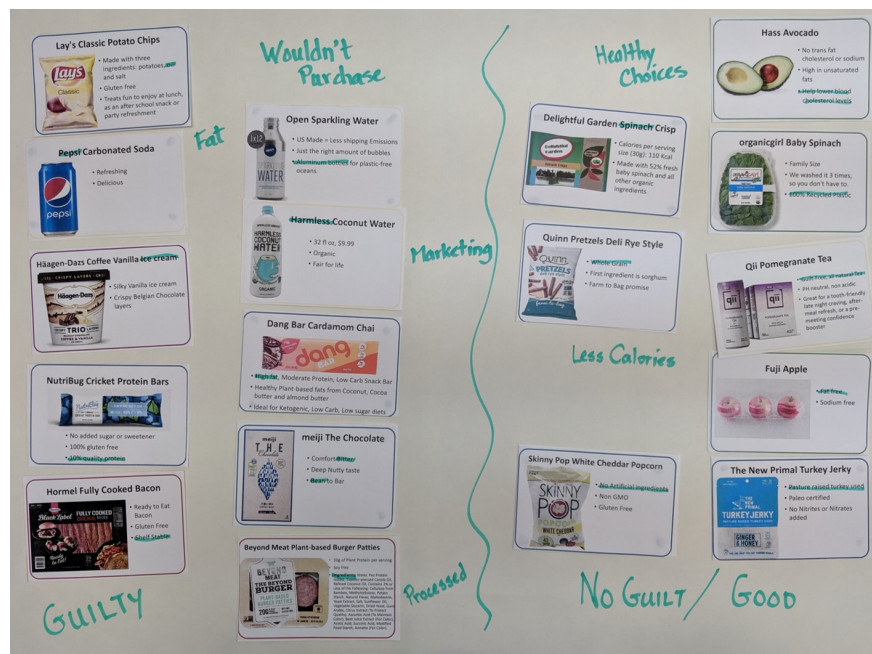


Figure 2.10: Products grouping example in Sorting task: 2 groups

most often. Products from these two groups were never placed together in the sorting task. Potato chips and soda have been classified into processed food and described mainly by negative attributes in other studies (Rodriguez-Oliveros et al., 2014).

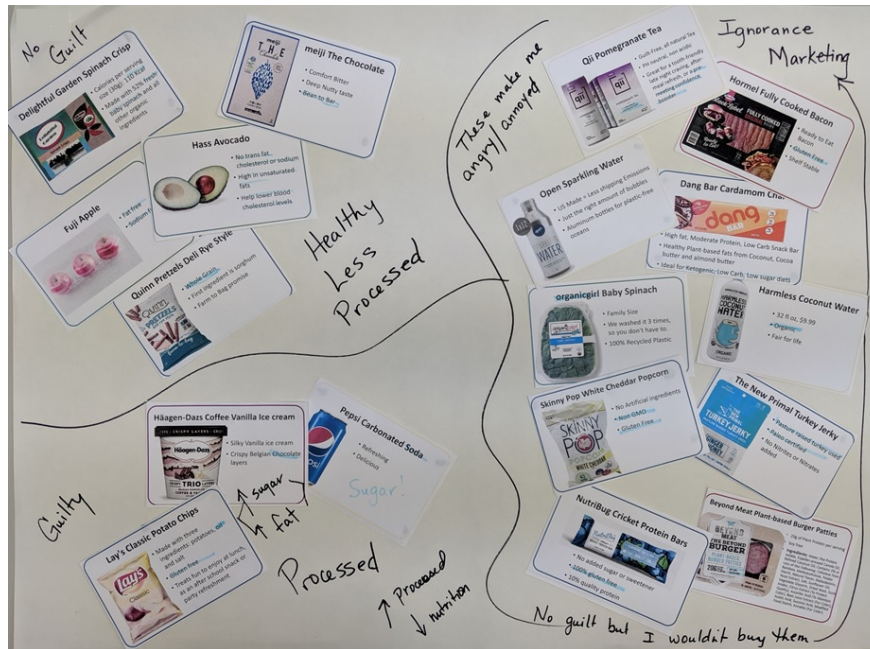


Figure 2.11: Products grouping example in Sorting task: 3 groups

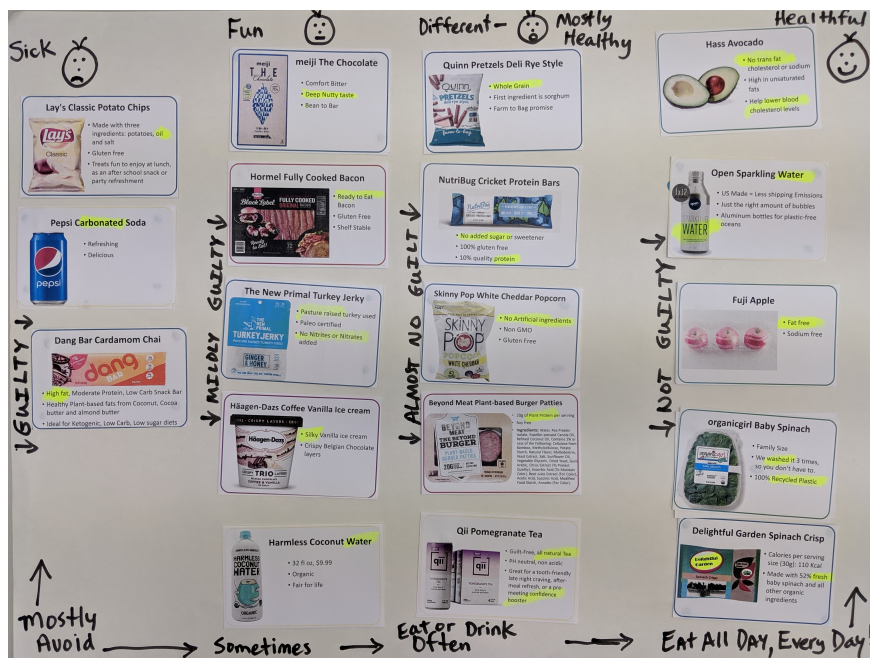


Figure 2.12: Products grouping example in Sorting task: 4 groups

There was a slight discontinuity between the third and fourth eigenvalues (Table 2.3). The first three dimensions in total constituted 51.93% of the variability, which was acceptable, considering a large amount of the tested products.

	Bsp	App	Avo	Spw	Pmt	Spc	Caw	Tkj	Bgp	Ptz	Cpb	Ppc	Cho	Dgb	Cbc	Vic	Ptc	Cbs
organicgirl baby spinach	100%																	
Fuji Apple	94%	100%																
Hass Avocado	84%	84%	100%															
Open Sparkling water	63%	56%	50%	100%														
Qii Pomegranate Tea	59%	66%	56%	50%	100%													
Spinach Crisps	53%	59%	53%	50%	53%	100%												
Harmless Coconut water	53%	47%	47%	63%	44%	38%	100%											
The New Primal Turkey Jerky	38%	41%	41%	31%	41%	44%	38%	100%										
Plant-based Burger Patties	41%	41%	34%	47%	38%	41%	38%	59%	100%									
Quinn Snacks Pretzels	28%	31%	34%	28%	41%	47%	34%	53%	41%	100%								
NutriBug Cricket Protein Bars	38%	38%	41%	41%	34%	47%	38%	47%	44%	50%	100%							
Skinny Pop Popcorn	34%	38%	41%	28%	47%	31%	38%	50%	53%	59%	50%	100%						
meiji The Chocolate	25%	28%	28%	31%	25%	50%	28%	38%	31%	56%	53%	41%	100%					
Dang Bar	28%	34%	41%	22%	44%	38%	28%	41%	44%	31%	44%	47%	28%	100%				
Hormel Cooked Bacon	6%	6%	6%	9%	19%	13%	9%	22%	22%	25%	25%	31%	34%	31%	100%			
Coffee vanilla Ice cream	0%	0%	0%	3%	3%	6%	9%	6%	9%	9%	16%	22%	25%	22%	69%	100%		
Lay's Potato Chips\n	0%	0%	0%	3%	3%	6%	6%	6%	13%	9%	19%	19%	25%	22%	59%	91%	100%	
Pepsi carbonated Soda	0%	0%	0%	3%	0%	6%	6%	6%	13%	6%	16%	22%	22%	22%	59%	91%	94%	100%

Figure 2.13: Co-occurrences matrix from Multiple Correspondence Analysis

Table 2.3: Eigenvalues table of Multiple Correspondence Analysis

	Eigenvalue	Percentage of variance (%)	Cumulative percentage of variance (%)
Dim 1	0.709	30.67	30.67
Dim 2	0.297	12.83	43.49
Dim 3	0.195	8.44	51.93
Dim 4	0.165	7.15	59.08
Dim 5	0.138	5.95	65.03
Dim 6	0.133	5.77	70.80
Dim 7	0.119	4.63	75.96
Dim 8	0.107	4.53	80.58
Dim 9	0.101	4.38	84.97

The extraction of first 3 dimensions (Dim1: 30.66%; Dim2: 12.83%, Dim3: 8.44%) resulted in product representation biplots as shown in Figure 2.14 and Figure 2.15 . If two products were close in the map, it indicated that a high number of subjects grouped them together.

According to Figure 2.14, the first dimensions opposed Soda, Potato chips, and Ice cream to whole foods of Spinach, Apple, Avocado. The second dimension opposed the whole foods to Quinn snacks pretzels and Turkey Jerky. Moreover, as shown in Figure 2.15 dimension 3 contrasted between products from meiji the chocolate and Dang Bar. The product space generated from MCA was consistent with the discussion output. Soda, Potato chips, and Ice creams were mentioned to make consumers feel guilty. Oppositely, whole foods such as Spinach, Apple, and Avocado could deliver no guilt perception, which showed that certain product categories could elicit similar guilt or no guilt perceptions. Except for Pepsi Soda, the other three beverage products were placed close to the whole food products in the map, indicating that similar guilt level was perceived.

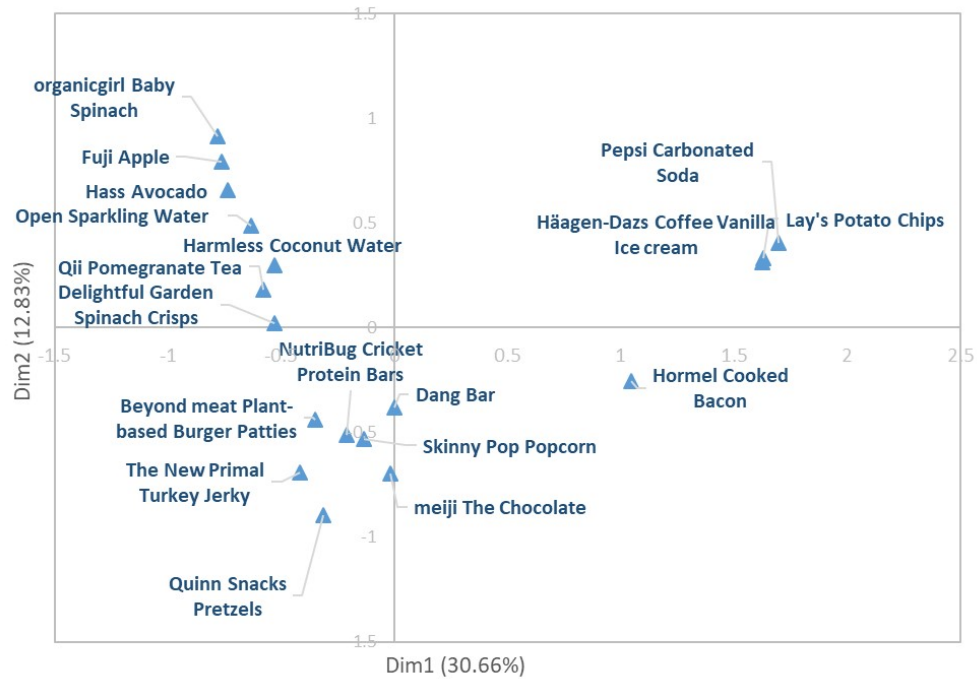


Figure 2.14: Multiple Correspondence Analysis factor map (Dim1 vs. Dim2)

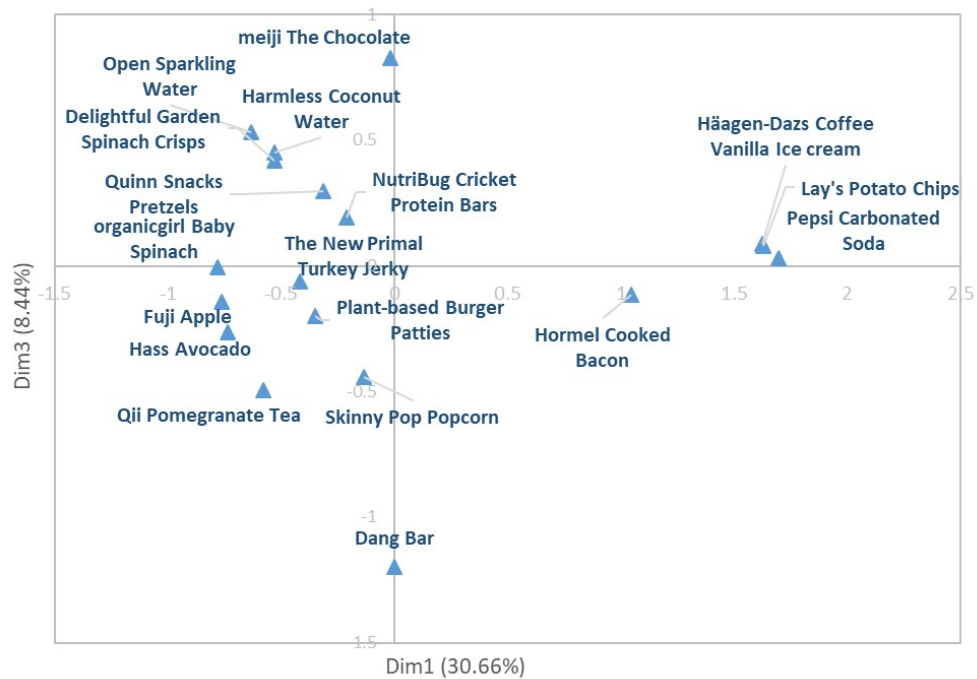


Figure 2.15: Multiple Correspondence Analysis factor map (Dim1 vs. Dim3)

Understanding the product space through textural data

How consumers group the products could be a valid indicator showing if guilt perception is essential for product differentiating or impact or not on consumers' food choice. Therefore,

occurrences of descriptions used in the grouping were summarized in Figure 2.16. A continuum of guilt was used by consumers: "Guilt", "Some guilt", "Mildly guilt", "No guilt", even though the consumers were asked to sorting the products based on the different guilt perceptions they may have, but they were requested to use their criteria for the task. Except for guilt perceptions, "Healthy" was ranked top 3, following by descriptors of "Would not buy", "Feel good", "Like", "Would eat or drink if available". It implied that guilt perceptions working with other criteria impact consumers' food choices and eating behaviors. Therefore, there would be a need to understand the relationships between these criteria in future studies.

Table 2.4: Eigenvalues table of Correspondence Analysis

	Eigenvalue	Percentage of variance (%)	Cumulative percentage of variance (%)
Dim 1	0.503	57.80	57.80
Dim 2	0.130	14.96	72.76
Dim 3	0.045	5.17	77.93
Dim 4	0.036	4.14	82.07
Dim 5	0.034	3.95	86.01
Dim 6	0.028	3.24	89.25

As shown in Table 2.4, the first eigenvalue of 0.503 indicated a strong association between products and words on the first dimension. With the 2nd eigenvalue of 0.13, it also suggested some association between the products and the words. Representation of the products and words on the first three dimensions from CA was created to better understand consumers' grouping trend (Figure 2.17 and Figure 2.18).

By comparing with the MCA factor map, grouping trends were consistently defined from CA. It was not surprising, as MCA is an extension of standard CA on multiple variables. The first two dimensions of the MCA factor map explained 43.49% of the dimensionality vs. 72.76% explanation from the CA map. A similar trend was found from other studies (Cariou and Qannari, 2018). This might be explainable as in MCA each individual grouping was considered as a set of categorical variables for performing the analysis. In other words, even though two consumers

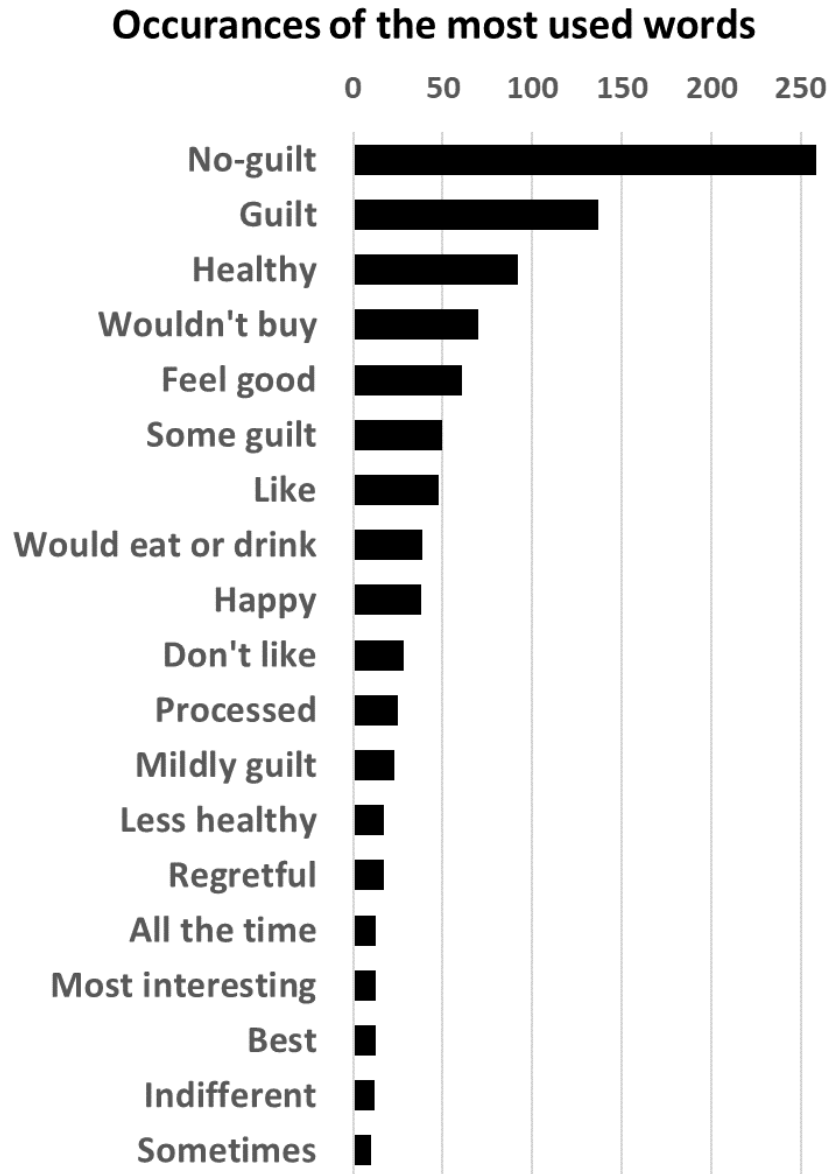


Figure 2.16: Occurrences of the most used words in Sorting task

both use "Feel good", they were considered different as subjected to two different variables. This complexity led to a low explanation when applied principal component types analysis. For CA, the analysis was generated based on a contingency table transformed from the sorting data. In this case, the subject (consumer) effect was removed, which enhanced the explanation in dimensionality.

MCA was necessary as it considered the contribution of each consumer, which was crucial

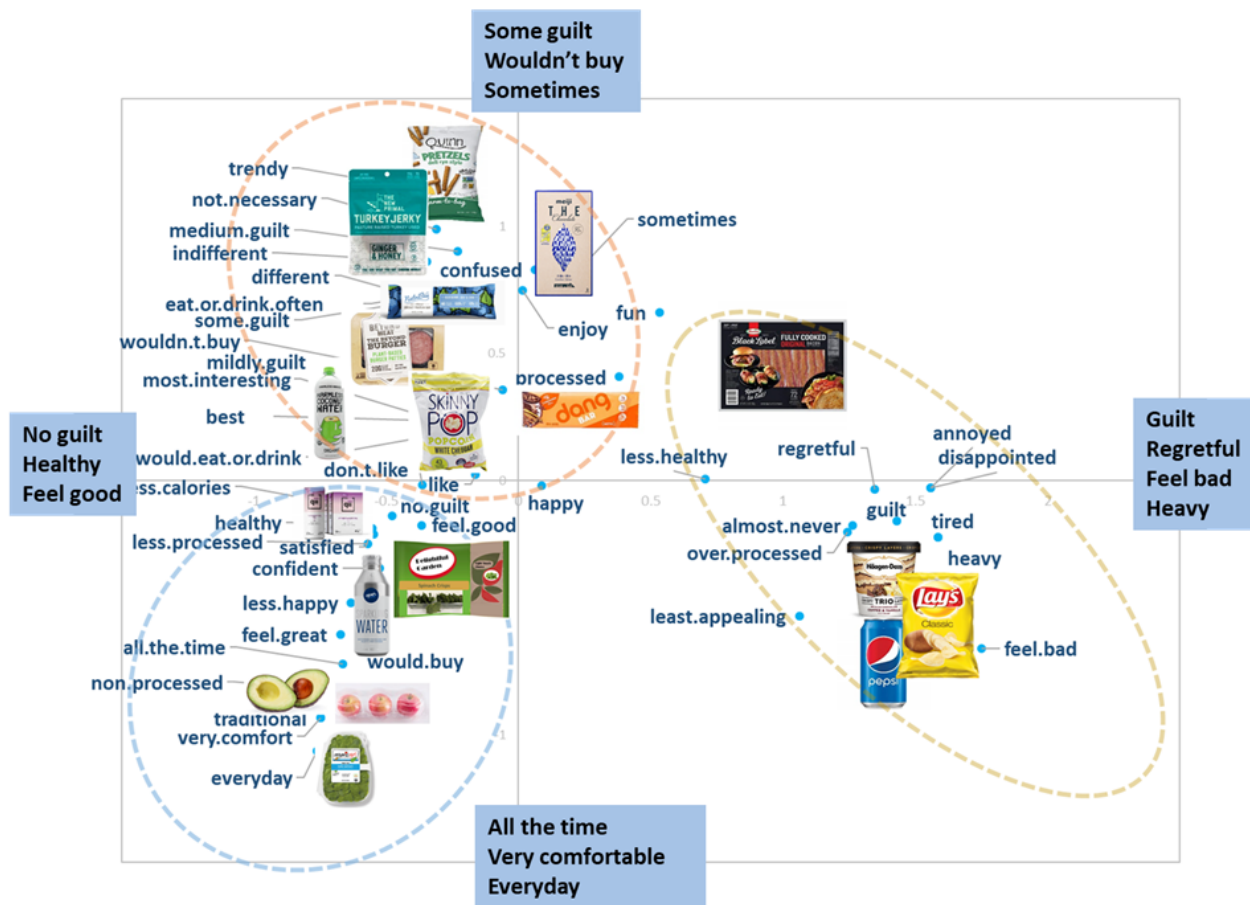


Figure 2.19: Products mapping (Dim1 vs. Dim2)

water, Delightful Garden Spinach Crisps, and Qii Pomegranate Tea which was relatively near the centrum of the biplot were delivering perceptions to consumers as "Less processed", "Healthy", "Less calories", "No guilt", "Feel good", "Less happy", "Satisfied" and "Confident".

Group 3 included the rest of the products and were mainly snacks, as well as the Beyond Meat Plant-based Burger Patties and Coconut Water, which were placed on the top left side of the map. They were highly associated with "Enjoy", "Sometimes", "Eat or drink often", "not necessary", "trendy" and different level of guilt perceptions "Some guilt", "Mildly guilt", "Medium guilt". This big group also included snack products that were associated with mixed and contrast words, reflecting the complexity consumers' opinions hold for the products.

Products like Dang Bar and Beyond Mean Plant-based Burger Patties were not discriminat-



Figure 2.20: Products mapping (Dim1 vs. Dim3)

ing from the first two dimensions, they flocked in clutter near to the centrum of the biplot. However, they distinguished out in the third dimension (Figure 2.20). The third dimension contrasted Beyond Meat plant-based burger patties and the Dang bar, which were highly associated with "Confused", "Over processed" to product meji The Chocolate which was associated more with "Enjoy" and "Less processed".

The differentiation identified from the CA map indicated that consumers used multiple dimensions or criteria when grouping the products, together with the guilt perception. The first dimension referred to guilt vs. no guilt, feel good vs. feel bad. The second dimension was about sometimes vs. all the time & every day. The third dimension referred to the contrast between Over processed and Less processed.

Product sorting results indicated that guilt perceptions, together with other criteria, could be important in discriminating products, such as overall liking and eating frequency. Further, explore the relationship between guilt perception and the other criteria would be meaningful

to decode consumers' food choice and eating behaviors.

2.4.3 What is food-related guilt

Emotional construct comes together with guilt

Different feelings or criteria were found coming together with guilt when consumers shared their experience and sorting results. Such as "Pleasure or not" or "Enjoy or not": very often when consumers shared their opinions on which kind of food made them feel guilty or no guilt, they tended to share also how they like the taste of that food. A right amount of examples were given showing how consumers made themselves "Feel good": proportioned packaging, simple preparation of chicken in the kitchen, eating fresh fruits and vegetables, plant-based food, veggie panini vs. zucchini grilled cheese, balance calories among food and drink categories, support local community & small business. "Matter or not to me" or "important or not" is another criterion used very often when discussing pasture-raised meat, tooth-friendly, price, and plant-based meat. Understanding the emotional construct of guilt is one of the objectives of this study. Combining the discussions and the output from the sorting task, a table (Table 2.5) was created indicating the emotion terms potentially negatively or positively associated to guilt.

Concept of food-related guilt

Distinct guilt perceptions regarding food and drink experience in the context of everyday life were able to be identified through the discussions. Factors identified could elicit guilt based on the intrinsic and extrinsic product characteristics comprehensively, social factors, and situational circumstances covering the complete experience from before eating or drinking, during (after) eating or drinking, to using. In addition, guilt perceptions had a potential impact on leading consumers to seek healthier and sustainable food solutions by positively impacting their food choice, eating behavior, purchase decision making, and lifestyle.

Some characteristics of guilt have been validated in this study: Even though the behaviors that evoke guilt normally violate a moral or ethical code. The codes may be implicit and accepted intuitively. Put it in another way, although almost everyone may have an ethical frame-

Table 2.5: Potential emotion construct identified from focus groups

Potentially negatively related to guilt	Potentially positively related to guilt
Balanced	Bloated
Comfortable	Bossy
Energetic	Confused
Energized	Doubtful
Fun	Gross
Good	Heavy
Healthy	Irresponsible
Interested	Lazy
Natural	Questionable
Pleasure	Regretful
Productive	Terrible
Refreshed	Tricked
Relaxed	Unproductive
Rewarded	Wasteful
Sustained	

work that guides their interpersonal and social behavior, very few people may carry the beliefs in consciousness all the time (Izard, 1977). This was found true for some of the factors identified from the focus group discussions. For example, consumers' opinions on GMOs, although consumers said they want to avoid it as much as they can, it may not always stay in consumers' mind. On the opposite, there were some other factors identified, showing that consumers did have a continual long time belief regarding what could make them feel guilt related to food. Causes of guilt could vary widely from individual to individual, from one ethnic group to another, and from culture to culture (Izard, 1977). This explained the disagreement on meat consumption found in the focus group discussions. Some people feel guilty over eating meat all the time, others were concerned about eating meat, and yet others may not have any concern over eating meat or any other edible substance at any time.

Continuum exist on food-related guilt levels

The above arguments justified that guilt tendency would vary from one individual to another lying on a continuum concerning food. This assumption would make it possible for the next step to build up a new scale to measure consumers' guilt tendencies related to food. Moreover,

as different product characteristics could elicit different levels of guilt, another scale to measure how product features drive consumers' guilt perceptions could be meaningful and helpful, especially for healthy and sustainable products' development.

2.4.4 Explore the concept of "Guilt-free pleasure" & opportunity in snack category

Start from the concept of "Good for you"

The concept "Good for you" was found to have multiple dimensions: (1) Treat myself good, indicating healthy for you, food consumers may not love, but they know it is perfect for them, make them feel good, feel that they are treating themselves good; (2) Feel satisfied, suggesting that consumers should not feel guilty during or after eating/drinking. Afterward, just feel satisfied; (3) Feel happy, where happiness not only comes from good taste. Knowing that they are doing something their body wants so that the body could be built itself does too. Fruits, vegetables, and salads generally could make consumers feel energized, active, happy and good; (4) Good for them, representing the food choice consideration for the whole family. One consumer mentioned 80% purchasing is for her husband, with all his allergies kept in her mind. Certain considerations also have been held for the baby or kids grown in the family. As mentioned by one 4-month baby's young mother, she would want her daughter to get used to eating real food, not only nutritional but also could enjoy different flavors and textures of the food.

To summarize, the nutritional value which could energize the body/mind is fundamental to consumers. Besides, emotional satisfaction without guilt through the whole experience of tasting and afterward, as well as the pleasure from the tasting were identified crucial to meet consumers' need of "Good for you".

Is it possible to indulge food but not feel guilty

With the concept of "Good for you" getting more transparent, very naturally, the authors would like to explore if it is possible to indulge foods not feel guilty. A certain degree of consensus

was achieved regarding the belief that indulgent is not necessarily related to guilt, but could be pure enjoyment and for special occasions. As introduced previously, eating on special occasions (seeing movies) or eating in a family environment will not make them feel guilty. Two additional examples were shared. As one consumer mentioned, if he was going to have a doughnut, he was going to enjoy it. Because it was the time to indulge in it and enjoy it. Another experience shared was that it was indulgent because it was not a cheap and rare occasion. Therefore, not feel guilt eating a lobster in a fancy expensive restaurant.

Concept of "Guilt-free pleasure"

Popcorn and cheese were mentioned by consumers that made them feel guilt-free pleasure. The cheese was considered as a guilt-free pleasure to quite some consumers: "Emotionally, cheese makes me feel very good, I just love it, I pair cheese with apples, and it gets me to eat an apple, cheese and grapes are good, because sweet and savory". Although cheese was animal-based, however, animals were not killed to produce it. Participants felt no guilt for eating it. Moreover, much pleasure was enjoyed in pairing it with other foods. This might not necessarily be true if the study was conducted in countries with a different culture. Popcorn was another product that could make many consumers feel guilt-free pleasure. They felt they could eat a lot, get satisfied, but not feel guilty as it was low in calories. What's more, participants considered popcorn had a minimum amount of ingredients in it ("It has some process in it, but you know for the most part it is just popcorn"). The pleasure part could be from the sensory experience eating popcorn, as one consumer described: "I am not guilty when eating popcorn, chewing it, just satisfied."

The concept of "Guilt-free pleasure" was defined based on the "Good for you" idea uncovered in this study. With nutritional value, which could energize the body/mind as the fundamental and emotional satisfaction without guilt though whole experience concerning food as the crucial main body. What makes the difference is the top section, the pleasure in seeking and enjoying healthier and sustainable food solutions. It could be as simple as the enjoyment of pairing cheese with grapes or the satisfaction from chewing popcorn with a minimum amount

of ingredients.

White space of snack products deliver "Guilt-free pleasure"

Spinach crisps associated with "Less Processed" and "Healthy" and "No guilt" were positioned closely to the whole foods in the first three dimensions. This was consistent with the findings from the co-occurrences table (Figure 2.13), as more than 50% of the time, Delightful Garden Spinach crisps were grouped with either Fuji Apple or Hass Avocado. Except for the Sparkling water and Pomegranate Tea were placed nearby in the biplot (Figure 2.19). However, not any snack products were positioned closely, indicating a white space for new snack development delivering the perceptions of "Less processed", "Less calories", "Healthy", "No guilt", "Feel good".

2.4.5 Limitations

It could be argued that consumers might try to speak what was wanted from the moderator but not really feel guilty with respect to food. However, the essence of focus group discussion is about acknowledging that it was the researcher's interest that directed the discussion. Considering the limited resource in timing and money, the strategy used in this study is to discuss the topic of guilt straightly so as to ensure a fruitful outcome. Regarding the groups' number needed for this study, it was not fixed at the beginning. After running the fourth group, with previous learning validated and extended. The author was confirmed that it was a good number of groups in generating enough quality output. The four groups were all conducted in the United States, as introduced previously. So there might be a different output if the study was implemented in a different culture. However, considering this is an exploration study uncovers the concept of guilt related to food, the design and number of groups are sufficient.

2.5 Conclusion

This study provided a complete exploration on the concept of food related guilt. Guilt perceptions regarding food and drink experience in the context of everyday life were explored. Factors identified could elicit guilt incorporating intrinsic and extrinsic product characteristics comprehensively, social factors, and situational circumstances covering the complete experience from before eating or drinking, during (after) eating or drinking, to using or packaging. Multiple factors were found working together leading to guilt perceptions, indicating its complexity and multidimensionality, and the need for a multidimensional scale for quantitative measurement in the future study.

The evidence that guilt tendency would vary from one individual to another lying on a continuum with respect to food provided from this study would make it possible to build up a new scale to measure consumers' guilt tendency related to food. Moreover, as different product characteristics could elicit different levels of guilt, it justifies the need to develop another scale, measuring how product features drive consumers' guilt perceptions.

This study provided input as well as new questions to be further explored in developing food-related guilt scales: Firstly, the emotion construct identified needs to be quantitatively screened and validated; Secondly, the relationship between guilt perception and other criteria defined in this study, such as overall liking and eating frequency should be continually be explored.

Guilt perceptions were found to have a potential impact on leading consumers to seek healthier and sustainable food solutions by positively impacting their food choice, eating behavior, purchase decision making, and lifestyle. This learning justified the importance of understanding guilt perception in promoting healthy eating behaviors.

Started from understanding the idea of "Good for you", this study explored the concept of "Guilt-free pleasure". White space of snack products that could deliver "Guilt-free pleasure" provided a new proposition opportunity for new healthy snack products' development.

2.6 Acknowledgment

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Chapter 3

Development and Validation of the Food Consumer Guilt Scale

3.1 Abstract

Consumers' guilt tendency concerning food in the context of daily life was recognized as an essential characteristic that could influence consumers' food choices, eating behavior, purchase decisions, and lifestyle. Given that several factors were identified that could elicit guilt perceptions related to food, a multidimensional measure of consumers' guilt tendency was required. This paper describes the development and validation of the Food Consumer Guilt Scale for measuring consumers' guilt tendencies to foods. A preliminary questionnaire was constructed and validated in terms of the total scale score distribution, reliability, internal validity, and discriminating capability. The updated scale with 16-item was found to be a reliable measurement instrument showing high internal consistency and possessing discriminating capability by cross-validating with a new sample of consumers. Factor analysis was conducted to uncover the underlying structure of the scale, which included three aspects: consumers' eating behavior, including perceived unhealthiness of food and less unhealthy eating style; secondly, the naturalness of the food and its packaging; thirdly, a sustainable and healthy lifestyle. Consumers identified with different guilt tendencies with food were found to have diverse preference patterns and distinct potential eating frequency on products tested. These findings suggested that the Food Consumer Guilt Scale could be a useful segmentation tool to understand consumers' food choices and eating behaviors, therefore, helpful in providing guidance promoting healthy and sustainable eating behaviors.

Keywords: Guilt, Food choice, Scale development, Consumer segmentation

3.2 Introduction

3.2.1 Background

The consumer trend of "Back to Basics" or "Seeking of simplicity", which favor hyper-local food, in-season fruit and vegetables, homemade, and using natural ingredients, were captured across different CPG categories. Evidence could be found from the rise of the artisan beauty using all-natural ingredients in skincare products, to craft spirits with a hand-made production process ([Euromonitor International, 2019b](#)). A similar trend of clean label and "simple" was popular several years ago. Consumers' concern of additives and fear for mass production may have been the contributors to this trend; on the opposite, cleaner labels were found associated with healthier perception ([Mintel, 2016](#)).

Conscious consumers were not only more mindful of their health and wellness management. They have also been concerned with animal welfare as well as the possible negative effect on the environment by mass industrial production. Specifically, biodiversity loss, competition for resources, waste, climate change, and ocean pollution were not only gaining more attention but driving consumers to consider more ethical living. Globally, consumers were showing potential willingness to pay more for environmentally conscious or eco-friendly products, as well as recyclable packaging based on an international lifestyle survey ([Euromonitor International, 2019a](#)). Initiatives to reuse plastic bottles, refillable containers, and reusable packaging were observed, especially among younger generations ([Euromonitor International, 2020](#)). Understanding the underlying factor that leads people to take the paths embracing a sustainable lifestyle would be meaningful for encouraging healthy and sustainable eating behaviors.

Guilt, defined as "an individual's unpleasant emotional state associated with possible objections to his or her actions, inaction, circumstances, or intentions" ([Baumeister et al., 1994](#)), was usually experienced from wrongdoing and responsibility for causing harm ([Izard, 1977](#); [Kubany and Watson, 2003](#)). Guilt-proneness was indicated by a dispositional tendency to experience guilt, as defined in the realm of moral emotions ([Leith and Baumeister, 1998](#); [Tangney et al., 2007](#)). As one of the self-conscious emotions, guilt was found involved in a wide variety of be-

haviors of empathy and caregiving (Tracy and Robins, 2004). There was a growing acknowledgment regarding how guilt is associated with problem-focused coping, where consumers act to make a positive behavioral change in terms of ability as well as willingness (Leith and Baumeister, 1998), which made the measure of guilt a useful tool in predicting potential positive behavioral change. A positive influence of guilt was demonstrated in reducing unhealthy food consumption (Mishra and Mishra, 2010). Moreover, guilt was demonstrated to convince consumers of the effectiveness of taking sustainable consumption choices by triggering an increase in perceived consumer effectiveness (PCE), where consumers were more likely to enact sustainable behaviors when they felt that their decisions would make a difference (Antonetti and Maklan, 2014).

More research showed the trend of consumers' seeking healthy and sustainable food choices (Aschemann-Witzel, 2015; Marchi et al., 2019). The previous study (Chapter. 2) found that guilt perceptions have a potential impact on leading consumers to seek healthier and sustainable food solutions by positively influencing their food choice, eating behavior, purchase decision making, and lifestyle. Choosing to eat a popsicle instead of ice cream, accept vegan or vegetarian meat substitutes, avoid single-use plastic and unnecessary packaging are examples of this behavior. This learning justified the importance of understanding guilt in promoting healthy eating behaviors, which led to the hypothesis that guilt tendency in food choice may bear a more substantial relationship with actual act as a promising indicator of food choice.

There has been a growing need for developing domain-specific experience of guilt (Leeming and Boyle, 2004). Contextualized guilt scales focused on the extent to which an individual tended to experience guilt in response to a particular type of event (Lacerenza et al., 2019). For example, the Trauma-Related Guilt Inventory (TRGI) assessed the guilt tendency responding to trauma (Kubany et al., 1996), and the Perceptions of Drinking Scale measured alcohol use-related shame and guilt (Treeby et al., 2019). Based on the literature review, there is no scale available measuring food-related guilt. Extending the research of guilt on consumer decision making and behaviors concerning food is necessary.

3.2.2 Measuring consumers' guilt tendency in food choice is a viable concept

Most of the time, people assume that unhealthy eating is the primary concern that may lead people to feel guilty in food choice. However, it is more than that. Previous study (Chapter. 2) found that several factors could elicit guilt, including the intrinsic and extrinsic product characteristics, social factors, and situational circumstances covering the complete experience from before eating or drinking, during (after) eating or drinking, to using or packaging. For example, eating food containing high fat, high sugar or high salt will make consumers feel guilty, but also not recognizing the ingredients, food spoiled before being used could lead to consumers' different levels of guilt perceptions.

The introduction of the theoretical meaning of the construct was considered as the initial step for questionnaire construction. Neophobia was conceptualized as "a personality trait, a continuum along which people can be located in terms of their stable propensity to approach or avoid novel foods" (Pliner and Hobden, 1992), food neophobia scale was developed to examine the neophobia-neophilia continuum in humans. On the other hand, the variety-seeking scale was defined as domain-specific, indicating that it was not a personality characteristic generalizable across all product categories, but specific to the for food consumption context (Van Trijp and Steenkamp, 1992). Causes of guilt could vary widely from individual to individual, from one ethnic group to another, and from culture to culture (Izard, 1977). This characteristic of guilt was found true for consumers' guilt tendency concerning food (Chapter. 2): it varies from one individual to another lying on a continuum about food. This assumption would make it possible for the next step to build up a new scale to measure consumers' guilt tendencies related to food.

In brief, prior study (Chapter. 2) demonstrated that measuring consumers' guilt tendency in food choice is a viable concept.

3.2.3 Research goal and objectives

To promote healthy and sustainable eating behaviors, this study aimed to develop a food consumer guilt scale, by measuring consumers' guilt tendency concerning food. Insights in consumers' guilt tendency as an underlying factor for understanding food choice and eating behaviors could be important for making marketing decisions through market segmentation, and communication strategies, as well as guiding new product development and portfolio management. Given that multiple factors may underlie variation in the guilt perception related to food, a multidimensional questionnaire was required to be developed so as to allow reliable and valid measurements.

This research was carried out in two studies: The objective of Study A was to: (1) Develop and validate a preliminary questionnaire for a multidimensional measure of consumers' guilt tendency concerning food. The objectives of Study B were to : (2) Validate the updated questionnaire with another sample of consumers; (3) Explore the underlying structure of the newly developed scale; (4) Investigate how different guilt tendencies may impact eating behaviors.

3.3 Methodology of Study A

3.3.1 Consumers

The preliminary questionnaire was administered to consumers from the Center for Sensory Analysis and Consumer Behavior database at Kansas State University (Manhattan, KS, USA). A total of 317 participants passed the screening and started answering the survey. Two consumers that passed screening did not complete the survey. Therefore, 315 responses were collected (Table 3.1). Screening criteria (Appendix.D) included consumers aged from 18 to 74 years old with some college or university degree. Demographic characteristics included the annual household income, as well as the number of adults and children who live in their household. Not only the consumers from the center's database at Kansas State University (Manhattan, KS, USA) were invited to take the survey. The survey was also communicated in the homepage of the KSU website (Koppel, 2019). Therefore, consumers who were interested in the study could take the

screening survey by clicking the link shared on the homepage. Consumers were aware that all participants who completed the survey would be entered into a drawing for one of five \$100 cash prizes.

3.3.2 Preliminary questionnaire construction

A preliminary questionnaire (detailed in Appendix.E) was generated based on the learning from prior focus group discussions. As described in (Baumeister et al., 1994): "... guilt means feeling bad, and so the capacity for guilt presumably begins with a natural basis for feeling bad", which has been a foundation the author followed in designing the statements. Initial Preliminary questionnaires were revised for English clarity. A preliminary questionnaire that included 23 items was launched on-line through Redjade software(Redjade®, Redwood Shores, CA, USA). These items were chosen for inclusion to represent the distinct experience with food that could elicit guilt: items 1-5 related to Before eating or drinking, items 6-13 related to During Eating or drinking, items 14-18, represented Using/Packaging and items 19-23 for Social/Community (Table 3.2). Subjects were instructed to indicate on a 7-point Likert scale the extent of their agreement with each item (1: Strongly Disagree, 7: Strongly Agree).

3.3.3 Data analysis

Items 3, 8, 13, 23 were stated negatively, therefore, for analysis, scoring on the scales for the negatively stated items were reversed. The preliminary questionnaire (23 items) was analyzed in 4 aspects: Firstly, once reversed, all items were summed for each individual, resulting a total scale score. Q-Q plot was produced using function qqnorm(), normality test was performed using function shapiro.test () in R version 3.6.2 (R Core Team, Vienna, Austria). Secondly, checked the internal validity score between items 4 & 5. Thirdly, internal consistency reliability evaluation using Cronbach's Alpha measure was performed with alpha() function in psych package in R to estimate how consistent the results were for the 23 items within the scale developed. Fourthly, evaluating the discriminating capability of each item among the identified guilt tendency clusters using one-way ANOVA with Tukey's test at a confidence level of 95% ($p = 0.05$) to

determine significant differences was conducted in XLSTAT version 2019 (Addinsoft, New York, NY).

3.4 Results & Discussion of Study A

3.4.1 Demographic

The sample consisted of 16.7% Males and 83.4% Females. The sample balanced well in terms of age group: 34%, 31%, and 34% aged between 18-34yr, 35-54yr, and 55-74yr, respectively. Education level was balanced well too, with 44% has completed a college degree, 33% had either Master or Doctoral degrees, 17% had some college but no degree and 7% for Professional degree or completed Technical school. 65% of subjects reported having two adults live in the house, 21% were single, 15% had three or more adults live in the house. 73% subjects reported no children under 18 living with them. Among the subjects reported having children live with them, 12% had one child, 10% had two children, and 4% reported three children live in the household. The reported household annual income was distributed as follows: <\$40,000, 25%; \$40,000-\$79,000, 36%; \$80,000-\$149,999, 36%; >\$150,000,4%.

A more balanced sample in gender and consumers with children in household would be recruited for Study B.

Table 3.1: Summary of Consumer Demographics: Study A

Demographic Profile	Panel Composition	
	Count	%
<u>Gender</u>		
Female	263	83%
Male	52	17%
<u>Age</u>		
18-34	109	34%
35-54	99	31%
55-74	107	34%
<u>Education</u>		
Some college but no degree	52	17%
College degree	140	44%
Master or Doctorate degree	102	32%
Prdofessional degree or Technical school	21	7%
<u>Income</u>		
\$0 - \$ 19,999	27	9%
\$20,000 - \$39,999	51	16%
\$40,000 - \$59,999	53	17%
\$60,000 - \$79,999	60	19%
\$80,000 - \$99,999	52	16%
\$100,000 - \$149,999	60	19%
\$150,000 or more	12	4%
<u>Adults in household</u>		
1	65	20%
2	205	65%
3	27	9%
4 or more	18	6%
<u>Children in household (Below 18)</u>		
None	230	73%
1	38	12%
2	33	10%
3 or more	14	5%

Table 3.2: Reliability analysis of Preliminary Food Consumer Guilt Scale: Study A

Food Consumer Guilt Scale item	Mean	SD	Corrected Item-Total
{Before eating or drinking}			
1. Eating sugary products from a co-workers desk in the office makes me feel bad. {Availability}	4.5	1.8	0.43
2. Ordering out instead of cooking a meal feels like a bad decision when there is ingredients available in the fridge. {Preparation & Cleaning}	5.4	1.5	0.54
3. Choosing foods that are inexpensive and easy for meal preparation makes me feel good. * {Preparation & Cleaning}	2.5	1.6	0.01
4. Homemade food makes me feel better because I control what is in it. {Homemade}	6.1	1.2	0.50
5. Homemade food makes me feel better because I can control the amount of each ingredient added to it. {Homemade}	6.1	1.2	0.50
{Eating or drinking}			
6. I feel bad for eating something that just tastes good but is not very healthy. {Craving for good taste}	4.2	1.5	0.62
7. I feel bad for craving “treats” in the evening. {Craving/desire in evening}	4.2	1.7	0.57
8. It is a pleasure to eat ice cream, even to excess. * {How much/how often}	4.3	1.8	0.07
9. I feel bad when I eat too many snacks, so I don't buy them very often. {How much/how often}	4.7	1.6	0.51
10. I feel good having soda with pizza, but not with salad. {Food pairing}	3.2	2.0	0.01
11. I feel bad when I eat fast/convenient food outside the home or while travelling. {Eating outside}	3.8	1.7	0.61
12. When I do not work out, anything I eat makes me feel bad. {After eating}	3.0	1.6	0.43
13. Eating snacks close to dinner time is not an issue to me. * {Eating occasions}	3.7	1.8	0.07
{Using/Packaging}			
14. When I snack, I feel better eating from a pre-portioned snack than from a larger package. {Proportioned packaging}	4.9	1.6	0.45
15. I feel bad when I buy food and it spoils before I have a chance to use it. {Food go bad before using}	6.4	1.0	0.29
16. I am skeptical of pre-packaged foods with really long shelf lives. {Long shelf life}	4.7	1.8	0.48
17. I prefer to buy products that are recyclable (over those that are not). {Single use regular plastic}	4.8	1.6	0.44
18. I would feel bad buying shrink wrapped sweet potatoes due to unnecessary packaging. {Unnecessary packaging}	4.7	2.0	0.42
{Social/Community}			
19. I feel good for buying from local food stores. {Support local community & small business}	5.6	1.3	0.36
20. When talking to my friends about food, I feel bad about unhealthy food choices. {Social pressure}	4.0	1.6	0.60
21. My friends' food choices influence my eating behavior. {Social pressure}	3.4	1.8	0.16
22. I spread my calories throughout my day so I can enjoy multiple types of foods and/or drinks. {Balance calories}	4.6	1.6	0.23
23. The fact that a product is plant-based or animal-based is not a concern to me. * {Need state}	3.2	1.9	0.13

* indicated scores to be reversed

3.4.2 Preliminary questionnaire test results

Item statistics and Total Scale Score (TSS) distribution

The mean value and standard deviation value of all items were summarized in Table 3.2. By checking what percentage of consumers gave each response to each of the items, it showed that consumers were giving different responses. Next, by summing all the items scores for each individual, resulted in a TSS distribution. Potential preliminary TSS ranged from 23 to 161.

The TSS calculated from the preliminary scale ranged from 42 to 142, with an average of 101.8, a median of 103, and a standard deviation of 14.9. Frequency distribution of TSS was unimodal and slightly left-skewed, as shown in Figure 3.1. Normal Q-Q plot (Figure 3.2) provided a graphical view of the normality of the distribution. Shapiro-Wilk test showed TSS was not normally distributed ($W = 0.987$, $p\text{-value} = 0.0075$), but slightly skewed to the left (skewness = -0.32).

The first and the third quartile ratings of TSS were 93 and 112, respectively. Consumers rating 93 or below might be considered as low guilt tendency concerning foods, 83 consumers were assigned in this cluster (Cluster 1). Consumers rating 112 or above was considered a high guilt tendency, and 74 consumers were included in this cluster (Cluster 3). The rest consumers ($n=158$) with TSS ranging higher than 93 and lower than or equal to 112 are medium guilt tendency (Cluster 2). All consumers who participated in answering the questionnaire could be potentially categorized into one of the three clusters based on the cutoff values, as shown in Figure 3.1.

Internal Validity Check

Items 4 and 5 with similar meaning was purposefully included in the scale. Similar responses (Table 3.2) were received for Q4 and Q5, indicating good internal validity. Therefore, only Q4 was kept for the next test, as it was simple and less detailed stated.

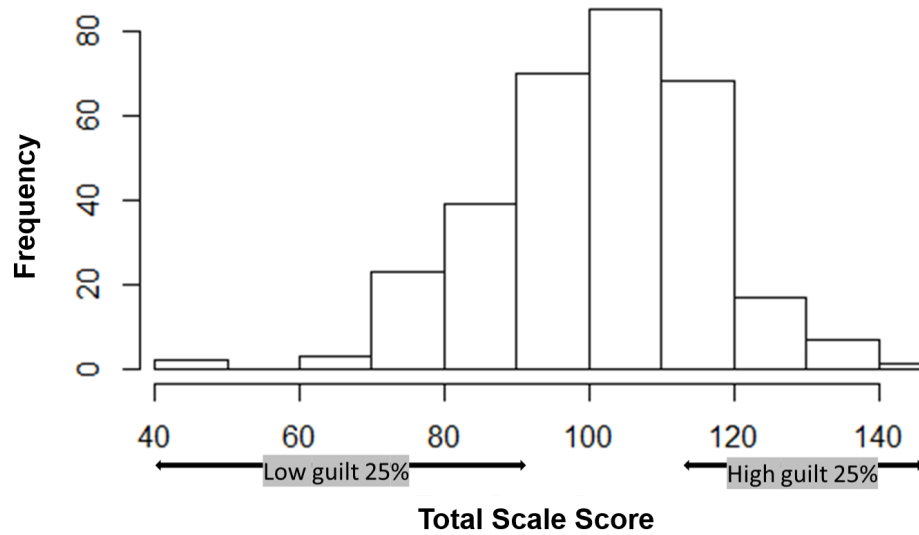


Figure 3.1: Distribution of Total Scale Scores from preliminary Food Consumer Guilt Scale: Study A

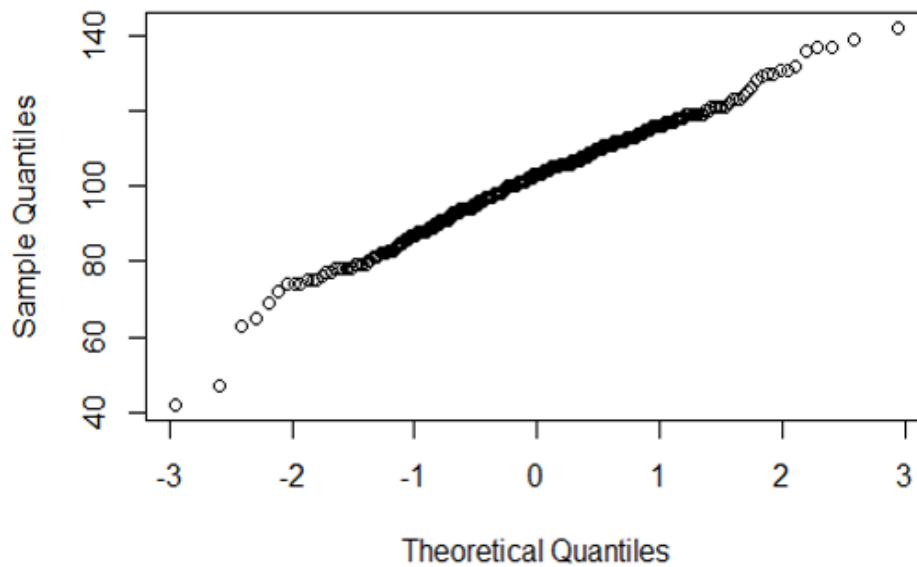


Figure 3.2: Q-Q plot from preliminary Food Consumer Guilt Scale: Study A

Reliability analysis

The scale's internal consistency (Cronbach's alpha) was 0.76(>0.7), indicated acceptable reliability (Urbina, 2014). Reliability analysis was widely approached in terms of testing the pre-

liminary scale and refinement of the initial scale items. The small scale of a pilot test of the preliminary scale for removing or refining items causing confusion or having similar contents before submitting to a bigger sample size (Van Trijp and Steenkamp, 1992) was a good practice, although it might not be reported in every instrument design studies. The corrected item-total correlation was calculated for each item; low item-total correlations indicated that the item did not correlate well with the scale overall. With 0.3 as the cutoff, eight items were suggested to be dropped based on the analysis: Q3, Q10, Q8, Q13, Q23, Q21, Q22, Q15 (Table 3.2). Results indicated that these items were not important related to guilt. Therefore, six items were removed: Q3, Q10, Q8, Q23, Q21, and Q22. Items Q13 and Q15 were modified to be tested again in Study B

Q13. I feel bad eating snacks close to dinner time. [Eating occasions]

Q15. I feel bad when food spoils before I have a chance to use it. [food go bad before using]

Discriminating capability

Results of One-way ANOVA with Tukey (HSD) as the post hoc multiple comparisons were summarized in Table 3.3. Results showed that discriminating scores were achieved on 13 items cross the 3 clusters, indicating consumers with different guilt scores rated the items differently. All items planed to be kept in study B gained good discriminating ability, except for item 4.

Table 3.3: Items and their average scores for the three consumer segments from preliminary Food Consumer Guilt Scale: Study A

Items	Clusters			Discriminating among clusters
	Cluster 1	Cluster 2	Cluster 3	
1. Eating sugary products from a co-workers desk in the office makes me feel bad.	3.4 c	4.6 b	5.5 a	Yes
2. Ordering out instead of cooking a meal feels like a bad decision when there are ingredients available in the fridge.	4.3 c	5.6 b	6.2 a	Yes
3. Choosing foods that are inexpensive and easy for meal preparation makes me feel good. *	2.4	2.4	2.8	
4. Homemade food makes me feel better because I control what is in it.	5.3 b	6.3 a	6.6 a	
5. Homemade food makes me feel better because I can control the amount of each ingredient added to it.	5.3 b	6.3 a	6.6 a	
6. I feel bad for eating something that just tastes good but is not very healthy.	2.9 c	4.4 b	5.3 a	Yes
7. I feel bad for craving “treats” in the evening.	2.9 c	4.3 b	6.3 a	Yes
8. It is a pleasure to eat ice cream, even to excess. *	4.0 b	4.2 ab	4.7 a	
9. I feel bad when I eat too many snacks, so I don't buy them very often.	3.6 c	4.9 b	5.6 a	Yes
10. I feel good having soda with pizza, but not with salad.	2.9 b	3.1 b	3.9 a	
11. I feel bad when I eat fast/convenient food outside the home or while travelling.	2.4 c	3.8 b	5.2 a	Yes
12. When I do not work out, anything I eat makes me feel bad.	2.0 c	3.2 b	4.0 a	Yes
13. Eating snacks close to dinner time is not an issue to me. *	3.5 b	3.6 b	4.3 a	
14. When I snack, I feel better eating from a pre-portioned snack than from a larger package.	3.9 c	4.9 b	5.8 a	Yes
15. I feel bad when I buy food and it spoils before I have a chance to use it.	6.0 b	6.5 a	6.7 a	
16. I am skeptical of pre-packaged foods with really long shelf lives.	3.5 c	4.8 b	5.8 a	Yes
17. I prefer to buy products that are recyclable (over those that are not).	3.7 c	4.9 b	5.7 a	Yes
18. I would feel bad buying shrink wrapped sweet potatoes due to unnecessary packaging.	3.4 c	4.7 b	6.0 a	Yes
19. I feel good for buying from local food stores.	5.1 c	5.6 b	6.3 a	Yes
20. When talking to my friends about food, I feel bad about unhealthy food choices.	2.8 c	4.0 b	5.3 a	Yes
21. My friends' food choices influence my eating behavior.	2.8 b	3.6 a	3.9 a	
22. I spread my calories throughout my day so I can enjoy multiple types of foods and/or drinks.	3.9 b	4.8 a	5.1 a	
23. The fact that a product is plant-based or animal-based is not a concern to me. *	2.5 b	3.3 a	3.6 a	

abc: Different letters within a row indicated statistically significant differences ($p < 0.05$) based on Tukey's test

* indicated scores to be reversed

In brief, a preliminary Food Consumer Guilt Scale was developed and tested. A proper score distribution was obtained, with three clusters of guilt tendencies shown, which was consistent with the hypothesis that Consumers' guilt tendency concerning food has predictive validity concerning variation in a daily food context. Internal validity check result between items 4 and 5 was good; item 5 was removed for simplicity purpose. Reliability analysis suggested six items to remove and two items to modify. The discriminating capability was good for all the items to be kept except for item 4. Therefore, 16 items were retained to be tested in study B.

3.5 Methodology of Study B

3.5.1 Updated questionnaire construction

Food Consumer Guilt Scale (FCGS) was developed to measure consumers' base guilt level concerning food. The tested questionnaire (Appendix.F) included two sections: Firstly, non-product related questionnaire including 16 updated items from the preliminary study and 12 items from the Food involvement scale. Ratings on each item were given on 7 point scale (disagree strongly = 1, to agree strongly = 7). The potential range of TSS for the Food Consumer Guilt Scale was from 16 to 112. Secondly, product-related questionnaire including 5 general questions. Consumers were required to rate on the 7-pt likert scale with different anchors.

3.5.2 Consumers

Similar consumer screening criteria was used as in Study A, except for the quality check: Consumers who picked the option of swimsuit for answering the question which products they have purchased in the last 30 days at a grocery store or supermarket were not eliminated. Consumers from the center's database at Kansas State University (Olathe, KS, USA) live in the Kansas City area were invited to take the screener by email sent through Compusense Cloud (Compusense, Inc., Guelph, Ontario, Canada), which means a different sample of consumers were used to test the updated questionnaire.

3.5.3 Stimuli

Four products identified from prior study (Chapter 2) that could elicit different guilt levels, were selected to test in a Randomized Complete Block Design. Products photos, as well as 2 to 3 claims describing the products, were shown on each page together with questions asked related to products (Table 3.4).

Table 3.4: Test Stimuli in Study 2B

Product Name	Test stimuli
Lay's Potato Chips	Lay's Classic Potato Chips  • Made with three ingredients: potatoes, oil and salt • Gluten free • Treats fun to enjoy at lunch, as an after school snack or party refreshment
Quinn Snacks Pretzels	Quinn Pretzels Deli Rye Style  • Whole Grain • First ingredient is sorghum • Farm to Bag promise
Delightful Garden Spinach Crisps	Delightful Garden Spinach Crisps  • Calories per serving size (30g): 110 Kcal • Made with 52% fresh baby spinach and all other organic ingredients
Organicgirl baby Spinach	organicgirl Baby Spinach  • Family Size • We washed it 3 times, so you don't have to • 100% Recycled Plastic

3.5.4 Data Analysis

For the non-product related questionnaire, no items were reversed before the analysis. The scale was validated in 4 aspects: 1, internal consistency reliability estimating using Cronbach's Alpha measure was performed with `alpha()` function in `psych` package in R version 3.6.2 (R Core Team, Vienna, Austria) as did in Study A. 2, checked the total scale score distribution, Q-Q plot was produced using function `qqnorm()`, normality test was performed using function `shapiro.test()` in R. 3, evaluate the discriminating capability of each item among the identified guilt tendency clusters using one-way ANOVA was conducted in XLSTAT as in Study A. 4, to understand the relationship with the Food involvement scale (FIS), Pearson correlation analysis was run between the FCGS and the FIS in XLSTAT. Chi-square analysis performed in XLSTAT was run to understand if there is any association with demographics in scoring the scale among the identified clusters.

To identify the underlying construct of the Food Consumer Guilt Scale, exploratory factor analysis using `fa()` function from package 'psych' was performed in R. Ordinary Least Squares (OLS) solution was used to find the minimum residual (`fm= "minres"`), as it was known to provide results similar to 'Maximum Likelihood' without assuming a multivariate normal distribution and derived solutions through iterative eigendecomposition like a principal axis (Revelle, 2017). Knowing that Varimax rotation was only used under the assumption that the factors are completely uncorrelated, oblique rotation (`rotate = "oblimin"`), which had been used in developing other guilt questionnaires (Bosch et al., 2019) was selected as there was no clear evidence showing there are no correlations between factors.

For the product-related questionnaire, the key questions to be explored here were two: Firstly, to identify whether consumers defined in different guilt tendency cluster would rate the products differently or not. One-way ANOVA was performed in XLSTAT to measure the effect of the cluster on rating the five basic general questions. Secondly, the authors would like to explore the rating pattern among clusters; one-way ANOVA results performed in XLSTAT with product effect measured were summarized in the bar chart.

3.6 Results & Discussion of Study B

3.6.1 Demographic

Four hundred fifty-eight consumers finished taking the screener (only 12 dropped). Among them, 444 qualified: 4 did not start taking the survey, partial results were 23. Therefore, 417 consumers completed the survey (Table 3.5).

The sample included 57% women and 43% men and ranged in age from 18-74 with 23%, 38%, and 39% aged between 18-34yr, 35-54yr, and 55-74yr, respectively. Regarding education level, 48% has completed a college degree, 33% has either Master or Doctoral degrees, 16% has some college but no degree and 3% for Professional degree or completed Technical school. It was stated that 71% having two adults live in the house, 14% were single, 15% had three or more adults live in the house. 58% of subjects reported no children under 18 living with them. Among the subjects reported having children live with them, 19% had one child, 15% had two children, and 8% reported three children live in the household. The reported household annual income was distributed as follows: <\$40,000, 7%; \$40,000-\$79,000, 30%; \$80,000-\$149,999, 50%; >\$150,000,13%.

3.6.2 Updated questionnaire test results

Total Scale Score (TSS) distribution

The TSS ranged from 27 to 111, with an average of 73.9 and a median of 75, standard deviation equaled to 14.9. The first and third quartile ratings were 65 and 84. The TSS distribution was shown in Figure 3.3. Skewness equaled to -0.34, was calculated by using skewness () function from moments package in R. Although the distribution was slightly left-skewed, visually, it was shown as a Normal and Unimodal distribution.

Shapiro-Wilk test showed that the Total scale score was not normally distributed ($W = 0.99049$, $p\text{-value} = 0.008603$). The null hypothesis that the data were from a normal distribution was rejected. However, "Normal Q-Q Plot" provided a graphical way that showed the normality of the distribution (Figure 3.4).

Table 3.5: Summary of Consumer Demographics: Study B

Demographic Profile	Panel Composition	
	Count	%
<u>Gender</u>		
Female	238	57%
Male	179	43%
<u>Age</u>		
18-34	96	23%
35-54	157	38%
55-74	164	39%
<u>Education</u>		
Some college but no degree	67	16%
College degree	199	48%
Master or Doctorate degree	141	33%
Prdofessional degree or Technical school	10	3%
<u>Income</u>		
\$0 - \$ 19,999	7	2%
\$20,000 - \$39,999	20	5%
\$40,000 - \$59,999	56	13%
\$60,000 - \$79,999	70	17%
\$80,000 - \$99,999	64	15%
\$100,000 - \$149,999	147	35%
\$150,000 or more	53	13%
<u>Adults in household</u>		
1	57	14%
2	298	71%
3	44	11%
4 or more	18	4%
<u>Children in household (Below 18)</u>		
None	239	58%
1	81	19%
2	64	15%
3 or more	33	8%

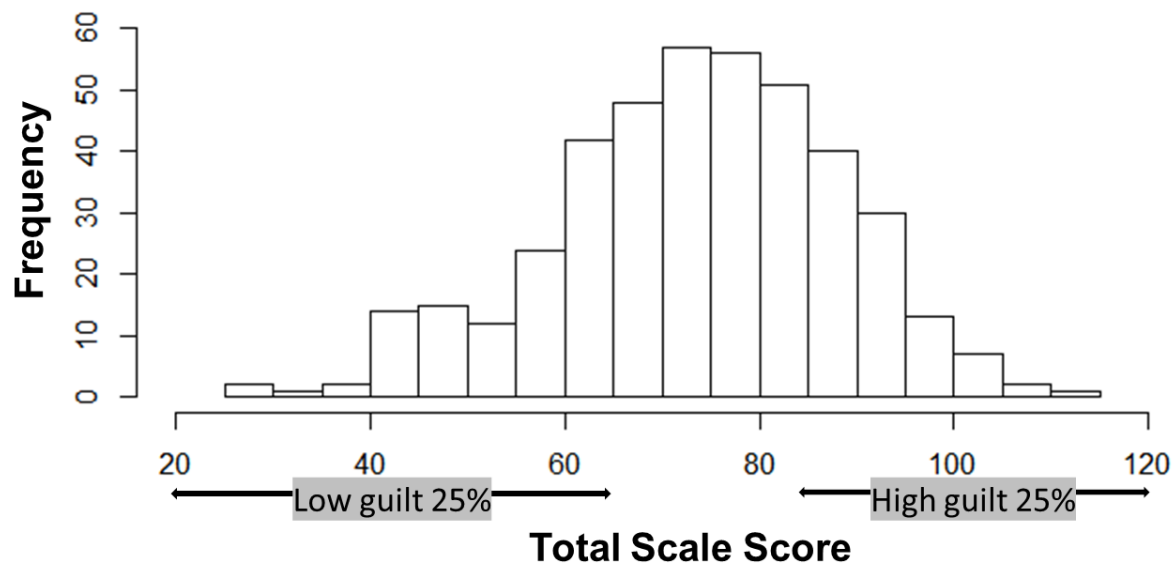


Figure 3.3: Distribution of Total Scale Scores from updated Food Consumer Guilt Scale: Study B

The TSS distribution provided one source of validity evidence, as the hypothesis was that individuals would vary in the Food Consumer Guilt Scale. This was important as the variability of scores can be useful in interpreting test results, and normal distribution was usually desired for norm assessments considering its statistical advantages. However, the TSS for FCGS was slightly skewed to the left, as there was no reason to believe the guilt tendency in food choice was normally distributed in the population. A similar trend was found in other scale's development. For example, the distribution of the variety-seeking scale was not normal ([Van Trijp and Steenkamp, 1992](#)). There was no reason to believe that the variety-seeking tendency with respect to foods was normally distributed in the population ([Van Trijp and Steenkamp, 1992](#)). For a meaningful interpretation of a respondent's test scores, it was helpful to choose the correct group against which to interpret the results. In developing the variety-seeking scale, the first and the third quartile ratings were used to categorize low and high variety-seeking tendencies. The same practices were followed in this study by using the first and third quartile ratings as cut-off values for clustering identification.

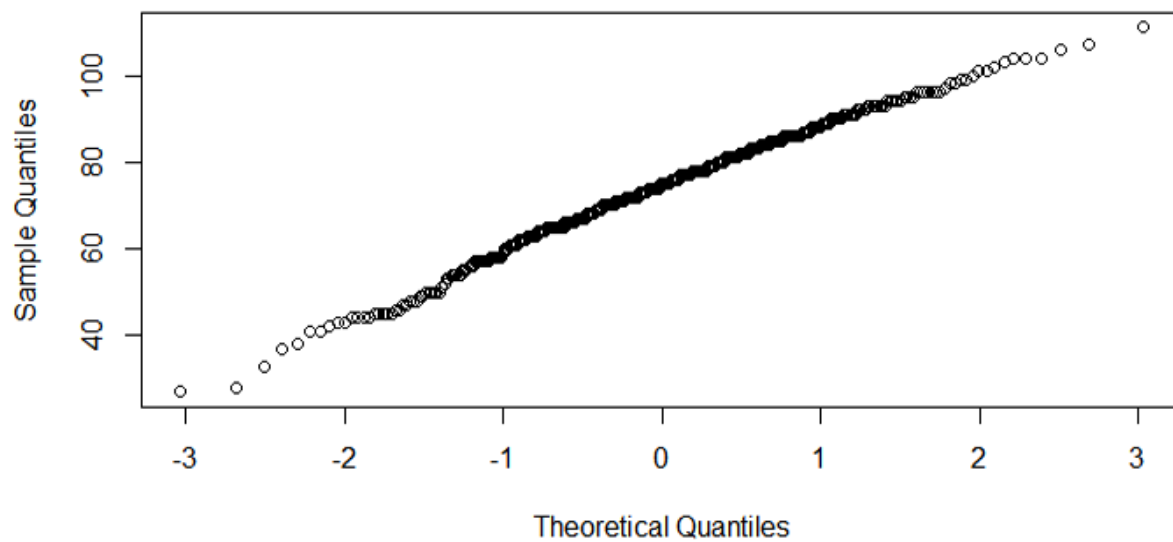


Figure 3.4: Q-Q plot from updated Food Consumer Guilt Scale: Study B

Reliability analysis

The scale's internal consistency (Cronbach's alpha) was 0.85, indicating very good reliability, which improved significantly after revisions from the preliminary questionnaire (Cronbach's alpha = 0.76). Coefficient alpha, also known as Cronbach's alpha, provided a solution assessing the internal consistency across test items that constituted the scale. When homogeneity across all test items was desired, Cronbach's alpha was an index of the extent to which the aim was realized ([Urbina, 2014](#)).

All items' corrected item-total correlation were higher than 0.3 (Table 3.6), indicating their important correlation with guilt. No items were suggested to be dropped for increasing reliability. Low corrected item-total correlations indicated that the item didn't correlate well with the scale. Overall, the acceptable cutoff value was suggested as 0.3 ([Nunnally and Bernstein, 1994](#)).

Score reliability implied preliminary evidence that a reliable measure of a sample of behavior was obtained and thus could provide indirect evidence of test score validity ([Urbina, 2014](#)).

Table 3.6: Reliability analysis of the updated Food Consumer Guilt Scale: Study B

Food Consumer Guilt Scale item	Mean	SD	Corrected Item-Total
{Before eating or drinking}			
1. Eating sugary products from a co-workers desk in the office makes me feel bad. {Availability}	4.2	1.8	0.55
2. Ordering out instead of cooking a meal feels like a bad decision when there are ingredients available in the fridge.			
{Preparation & Cleaning}	4.8	1.7	0.59
3. Homemade food makes me feel better because I control what is in it. {Homemade}	5.8	1.2	0.56
{Eating or drinking}			
4. I feel bad for eating something that just tastes good but is not very healthy. {Craving for good taste}	4.2	1.6	0.72
5. I feel bad for craving “treats” in the evening. {Craving/desire in evening}	4.1	1.7	0.62
6. I feel bad when I eat too many snacks, so I don’t buy them very often. {How much/how often}	4.2	1.6	0.55
7. I feel bad when I eat fast/convenient food outside the home or while travelling. {Eating outside}	4.0	1.8	0.61
8. When I do not work out, anything I eat makes me feel bad. {After eating}	3.1	1.6	0.44
9. I feel bad eating snacks close to dinner time. {Eating occasions}	4.5	1.8	0.55
{Using/Packaging}			
10. When I snack, I feel better eating from a pre-portioned snack than from a larger package. {Proportioned packaging}	4.7	1.8	0.39
11. I feel bad when food spoils before I have a chance to use it. {Food go bad before using}	6.3	1.1	0.34
12. I am skeptical of pre-packaged foods with really long shelf lives. {Long shelf life}	5.0	1.8	0.51
13. I prefer to buy products that are recyclable (over those that are not). {Single use regular plastic}	4.9	1.6	0.39
14. I would feel bad buying shrink wrapped sweet potatoes due to unnecessary packaging. {Unnecessary packaging}	4.4	2.1	0.43
{Social/Community}			
15. I feel good for buying from local food stores. {Support local community & small business}	5.7	1.2	0.35
16. When talking to my friends about food, I feel bad about unhealthy food choices. {Social pressure}	4.1	1.7	0.62

Discriminating capability

The first and the third quartile ratings of TSS were 65 and 84, respectively. Consumers rating 65 or below might be considered as low guilt tendency concerning foods, 112 consumers were assigned in this cluster (Cluster 1). Consumers rating 84 or above were considered to have a high guilt tendency, and 104 consumers were included in this cluster (Cluster 3). The rest of consumers (n=201) with FCGS scores ranging higher than 65 and lower than 84 were medium guilt tendencies (Cluster 2). All consumers who participated in answering the questionnaire could be categorized into one of the three clusters based on the cutoff values, as shown in Table 3.7.

Results of One-way ANOVA with Tukey (HSD) as the post hoc multiple comparison method was summarized in Table 3.7 showed that discriminating scores were achieved on all items across the 3 clusters, indicating a good discriminating capability of all the items.

Assessment of discriminating capacity provided another source of validation evidence. The Personal Involvement Inventory was used to evaluate consumers' involvement with chocolate milk desserts enriched with antioxidants, and discriminating scores were found across all items (Ares et al., 2010).

Table 3.7: Items and their average scores for the three consumer segments from the updated Food Consumer Guilt Scale: Study B

Items	Cluster			Discriminating among clusters
	Cluster 1 (n=112) Low guilt 16 ≤ TSS ≤ 65	Cluster 2 (n=201) Intermediate 65 < TSS < 84	Cluster 3 (n=104) High guilt 84 ≤ TSS ≤ 112	
1. Eating sugary products from a co-workers desk in the office makes me feel bad.	2.8 c	4.2 b	5.7 a	Yes
2. Ordering out instead of cooking a meal feels like a bad decision when there are ingredients available in the fridge.	3.4 c	5.0 b	6.0 a	Yes
3. Homemade food makes me feel better because I control what is in it.	4.9 c	6.0 b	6.5 a	Yes
4. I feel bad for eating something that just tastes good but is not very healthy.	2.7 c	4.2 b	5.7 a	Yes
5. I feel bad for craving “treats” in the evening.	2.6 c	4.1 b	5.5 a	Yes
6. I feel bad when I eat too many snacks, so I don't buy them very often.	3.0 c	4.3 b	5.3 a	Yes
7. I feel bad when I eat fast/convenient food outside the home or while traveling.	2.4 c	4.1 b	5.3 a	Yes
8. When I do not work out, anything I eat makes me feel bad.	2.1 c	3.1 b	4.1 a	Yes
9. I feel bad eating snacks close to dinner time.	3.1 c	4.6 b	5.7 a	Yes
10. When I snack, I feel better eating from a pre-portioned snack than from a larger package.	3.7 c	4.7 b	5.7 a	Yes
11. I feel bad when food spoils before I have a chance to use it.	5.7 c	6.4 b	6.7 a	Yes
12. I am skeptical of pre-packaged foods with really long shelf lives.	3.7 c	5.1 b	6.1 a	Yes
13. I prefer to buy products that are recyclable (over those that are not).	4.1 c	5.0 b	5.7 a	Yes
14. I would feel bad buying shrink wrapped sweet potatoes due to unnecessary packaging.	3.1 c	4.5 b	5.7 a	Yes
15. I feel good for buying from local food stores.	5.2 c	5.6 b	6.4 a	Yes
16. When talking to my friends about food, I feel bad about unhealthy food choices.	2.8 c	4.1 b	5.5 a	Yes

abc: Different letters within a row indicate statistically significant differences (p < 0.05) based on Tukey's test

Table 3.8: Contingency table (Responses of Q6 / Cluster): Study B

Categories	Cluster 1 Low guilt	Cluster 2 Medium guilt	Cluster 3 High guilt
0	63	109	67
1	24	35	22
2	12	41	11
3 or more	13	16	4

Association with demographics in scoring Food Consumer Guilt Scale among clusters

No significant association was found with age, gender, education, income in terms of scoring the Food Consumer Guilt Scale by using the Chi-square test.

A significant association (p-value = 0.049) was found between the number of children in a household among the guilt level clusters (Table 3.8). Test of independence between the rows and the columns showed that, for the group with two children in the household, a significant higher proportion were identified as cluster 2: medium guilt tendency concerning food, compared to the portions of “medium guilt” in the other groups. For the group with three or more children in the household, a higher percentage was identified as Low guilt tendency concerning food. It could be challenged that sample size (33) for a group with three or more children was not enough, lower number compared to the other groups; however, with a sample size larger than 30, it was good enough to conduct a Chi-square test.

Explore the relationship with Food Involvement Scale (FIS)

Food involvement scale is a measure of involvement with the whole process of food consumption, from purchasing to the final disposal. It had 12 items in total. Potential total FIS scores ranged from 12 to 84, with items (1,2,4,8,9,11) reversed before the calculation.

In this study, total FIS scores ranged from 37 to 83, with a mean as 63.5 and median as 64. The first and third quartile ratings were 58 and 70, respectively.

Correlation analysis was run between the Total scale score from FCGS and total scale score from FIS in XLSTAT. The result suggested that a significantly weak positive correlation ($r=0.19$) were found between FIS & FCGS (p-values = $1e-04$), indicating there is no clear correlation say-

ing that consumers with higher involvement in food necessarily tend to have higher guilt level.

Correlation between different measures provided convergent and discriminant validity evidence of the construct (Urbina, 2014). Convergent validity indicated high correlations between the scale scores and those of other instruments to assess the same construct; in contrast, discriminant validity was based on the patterns of divergence, such as consistently low correlations between measures that were supposed to differ. In this study, the correlation between FCGS and FIS was explored, with only a very weak relationship found. As far as the author's knowledge, there has been no published scale that examined the same consumer characteristic as FCGS. The significant weak relationship identified between FIS and FCGS was just a start in exploring the relationship between FCGS with other measures.

Factor Analysis

Exploratory factor analysis was performed to identify underlying constructs to explain the 16 items scale. The number of factors was set at 3, as three factors had eigenvalues more than 1. Simple structure (results with only single loading, and all variables significant) was achieved with cutoff as 0.3 (Table 3.9).

Goodness-of-fit statistics provided an evaluation of how well the model fits the data. The root mean square of residuals (RMSR) was 0.03, which was acceptable as this value was the square root of the difference between the residuals of the sample covariance matrix, typically well-fitting models obtaining values less than 0.05 (Hooper et al., 2007). The RMSEA (root mean square error of approximation) index indicated how well the model fits the population's covariance matrix. Its value was 0.028, showed a good model fit, as recently proposed cutoff value suggested that below 0.07 was a good fit (Hooper et al., 2007).

Three factors were identified (Table 3.9): Factor 1 included ten items with loadings ranged from 0.35 to 0.71 and an average of 0.56. Factor 2 included three items, with item FGS14, had the highest loading as 0.73, following by 0.56 and 0.46, respectively, from item FCGS13 and FCGS12. Factor 3 included three items as well, but overall smaller loadings ranged from 0.35 to 0.46.

Table 3.9: Factor loadings for ordinary least squares analysis with oblimin rotation of the items from FCGS

Items	MR1	MR2	MR3
FCGS1	0.67	0.04	-0.13
FCGS2	0.35	0.12	0.29
FCGS3	0.11	0.26	0.46
FCGS4	0.71	0.08	0.04
FCGS5	0.71	-0.06	0.02
FCGS6	0.52	0.08	0.03
FCGS7	0.52	0.07	0.15
FCGS8	0.57	0	-0.13
FCGS9	0.51	-0.08	0.19
FCGS10	0.36	-0.21	0.30
FCGS11	0.03	0.03	0.44
FCGS12	0.10	0.46	0.21
FCGS13	-0.03	0.56	0.11
FCGS14	0.05	0.73	-0.06
FCGS15	-0.07	0.29	0.34
FCGS16	0.70	0	-0.03

Underlying construct of Food Consumer Guilt Scale: interpretation of factor analysis

Factor mapping showing items in each factor following a decreasing order of the loadings provided an efficient way to interpret the result (Figure 3.5). Items constituted Factor 1 uncovered the instinct value of consumers' relationship with food: eating behavior, which has two aspects that might elicit consumers' guilty perception in food choice. Firstly, the perceived unhealthiness of food, including items FCGS4 (0.71), FCGS16 (0.7), FCGS1 (0.67), all have loadings higher than the average (0.56). Secondly, less healthy eating style, which covered the rest 7 items: FCGS5 (0.71), FCGS8 (0.57), FCGS 6 (0.52), FCGS7 (0.52), FCGS9 (0.51), FCGS10 (0.36), FCGS2 (0.35). Factor 1 indicated that the perception of food is healthy or not matters a lot to consumers in eliciting guilt. However, even healthy food, but eat less healthily, will lead consumers to feel guilty.

Factor 2 included items FCGS14, FCGS13, FCGS12 uncovered the additional feature of food, which could elicit guilty perception in food choice. Items FCGS14 (0.73) and FCGS13 (0.56) represented the package characteristics, and item FCGS12 (0.46) could be regarded as the nat-

urality of the food. Additional features or external factors of food, including unnecessary and single-use packaging, and ingredients added to extend the shelf life, were identified as the 2nd factor elicit guilt. Overall, factor 2 was less critical than factor 1 in eliciting guilt. However, FCGS14 had the highest loading, indicating unnecessary packaging was most important elicit guilt perception.

Factor 3 was composed of items with less loadings overall, including items FCGS3, FCGS11, and FCGS15. Factor 3 disclosed consumers' sustainable engagement with food and a healthy lifestyle. Besides the concerns on mass production with "highly processed" foods packed with preservatives and additives, calorie-dense food high in sugars and saturated fat, but its negative impact on creating an imbalance in environment, economic and social dynamics could elicit guilt. Factor 3 identified the potential changes consumers would like to take in coping production and processing, food waste, and create a fair condition for producers, therefore, promoting sustainable and healthy for themselves as well as the planet. Overall, factor 3 has a weaker impact on guilty perception compared to the first two factors. It was making sense, as it represented the external feature of food with a lower impact compared to the intrinsic aspect of food to people.

Factor analysis could provide a source of validity evidence on the scale's internal test structure. A large number of studies used factor analysis to reduce the amount of dimensions needed to describe data that were derived from a set of measured variables and to discover the structure underlying the measures (Bell and Marshall, 2003; Kubany et al., 1996; Steptoe et al., 1995; Van Trijp and Steenkamp, 1992). Several different procedures could be conducted to extract factors, depending on the assumptions and methods that were used. In this study, multiple procedures in extracting the factors were tested; the solution reported was considered as the most potential in clearly introducing the structure of the developed scale. The three aspects of the underlying structure of FCGS captured consumers' distinct experiences with food. Moreover, it validated one feature that eating is just one of the holistic approaches consumers take to keep themselves and the planet well. It implied that potentially, the FCGS could be useful in generating insight on promoting consumers to lead a healthy and sustainable eating behavior.

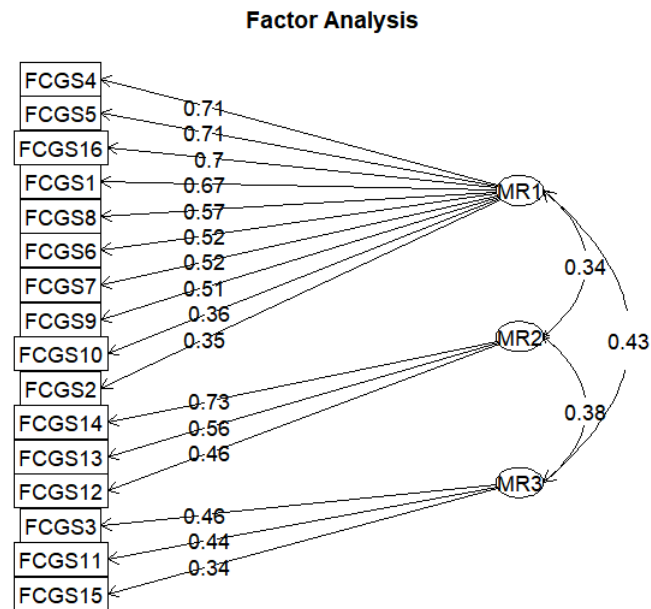


Figure 3.5: Factor Mappings of the items from FCGS: Study B

3.6.3 Exploration of how different guilt tendencies may impact on eating behaviors

To identify whether consumers defined in different guilt tendency cluster rated the products differently or not, the effect of cluster on rating the 5 basic general questions were summarized in Table 3.10. On the other hand, to explore the rating pattern among clusters, one-way ANOVA result performed in XLSTAT with product effect measured were summarized in bar charts.

Rating on liking perception with 7-pt scale:

Box plot of liking perception scores (Figure 3.6) across all consumers indicated that big variance existed for ratings on the four products. Interquartile range differed widely on products, from 3 on Delightful Garden Spinach Crisps, to 2 for Lay's Classic Potato Chips and organic-girl Baby spinach, to as small as 1 for Quinn Pretzels Deli Rye Style. Different clusters of guilt tendency consumers rated differently in liking, which could explain the source of the variance. There were significant differences between clusters in giving liking scores on products Lay's

Table 3.10: Least square means from ANOVA for rating on products across clusters: Study B

Ratings	Products	Cluster		
		Cluster 3	Cluster 2	Cluster 1
Liking	Lay's Classic Potato Chips	4.9 B	5.4 A	5.7 A
	Quinn Pretzels Deli Rye Style	4.5 A	4.5 A	4.3 A
	Delightful Garden Spinach Crisps	4.0 A	3.6 AB	3.4 B
	organicgirl Baby Spinach	6.0 A	5.7 A	5.2 B
	Lay's Classic Potato Chips	5.8 A	5.1 B	3.6 C
	Quinn Pretzels Deli Rye Style	3.6 A	3.0 B	2.5 C
Guilty	Delightful Garden Spinach Crisps	2.2 AB	2.3 A	1.8 B
	organicgirl Baby Spinach	1.2 A	1.4 A	1.2 A
	Lay's Classic Potato Chips	6.2 A	5.9 A	5.5 B
	Quinn Pretzels Deli Rye Style	4.6 A	4.5 A	4.5 A
	Delightful Garden Spinach Crisps	4.1 A	4.1 A	4.1 A
	organicgirl Baby Spinach	1.6 A	1.7 A	1.5 A
Processed	Lay's Classic Potato Chips	1.9 B	2.0 B	2.4 A
	Quinn Pretzels Deli Rye Style	3.9 A	4.1 A	4.2 A
	Delightful Garden Spinach Crisps	5.1 A	5.1 A	5.1 A
	organicgirl Baby Spinach	6.8 A	6.7 A	6.7 A
	Lay's Classic Potato Chips	3.3 C	4.0 B	4.5 A
	Quinn Pretzels Deli Rye Style	3.5 A	3.7 A	3.7 A
Healthy perception	Delightful Garden Spinach Crisps	3.4 A	3.0 AB	2.6 B
	organicgirl Baby Spinach	5.6 A	5.1 B	4.7 C
	Lay's Classic Potato Chips	3.3 C	4.0 B	4.5 A
	Quinn Pretzels Deli Rye Style	3.5 A	3.7 A	3.7 A
	Delightful Garden Spinach Crisps	3.4 A	3.0 AB	2.6 B
	organicgirl Baby Spinach	5.6 A	5.1 B	4.7 C
Eating frequency	Lay's Classic Potato Chips	3.3 C	4.0 B	4.5 A
	Quinn Pretzels Deli Rye Style	3.5 A	3.7 A	3.7 A
	Delightful Garden Spinach Crisps	3.4 A	3.0 AB	2.6 B
	organicgirl Baby Spinach	5.6 A	5.1 B	4.7 C
	Lay's Classic Potato Chips	3.3 C	4.0 B	4.5 A
	Quinn Pretzels Deli Rye Style	3.5 A	3.7 A	3.7 A

ABC: Different letters within a row indicate statistically significant differences ($p < 0.05$) according to Tukey's test

Classic Potato chips, Delightful Garden Spinach Crisps, and organicgirl Baby Spinach, but not for product Quinn Pretzels Deli Rye Style (Table 3.10). Especially, Cluster 1 and Cluster 3 gave discriminating liking scores on the products mentioned above: Significant difference was found for liking perception on spinach between cluster 1 and cluster 2&3. Consumers assigned in cluster 2&3 liked the spinach product more than cluster 1. Meanwhile, significant difference was found for perceived liking on Lay's Classic Potato Chips between cluster 1&2 and cluster 3; it was more liked by cluster 1&2 than the other cluster. On the other hand, a significant difference was only found between cluster 1 & 3 for perceived liking score on product Delightful Garden Spinach crisps, it was more liked by cluster 3 than cluster 1.

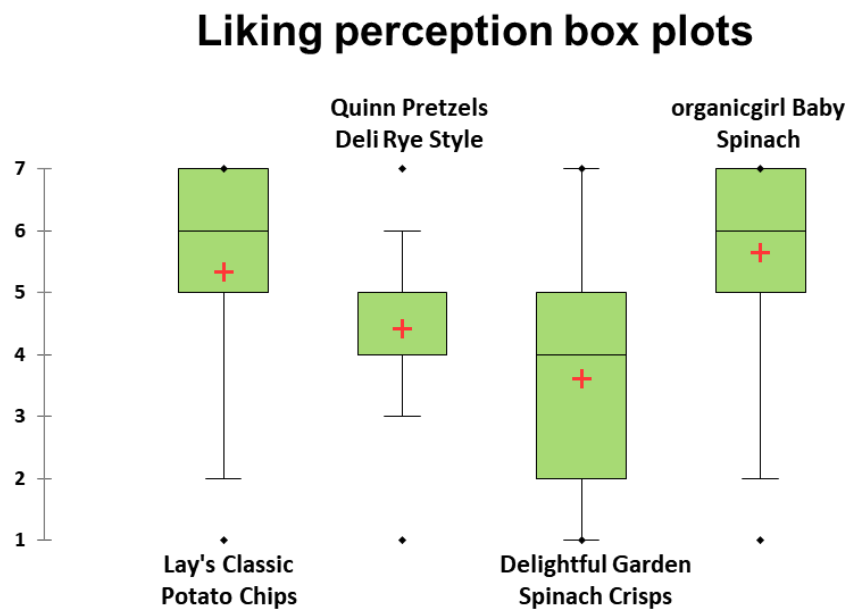


Figure 3.6: Boxplot of rating on perceived liking: Study B

By reviewing the preference pattern from Figure 3.7 it could be seen that averagely, spinach was rated the highest liking score, as well as for cluster 2 and 3. However, cluster 1 (low guilt tendency) like the potato chips most directly.

Overall the Delightful Garden Spinach Crisps product received the lowest liking perception scores no matter in average or by clusters. Unlike the other product, this product was developed internally and consumers were completely unfamiliar with it. Prior non-branded central location test results indicated that good promising scores were rated by regular vegetable snack

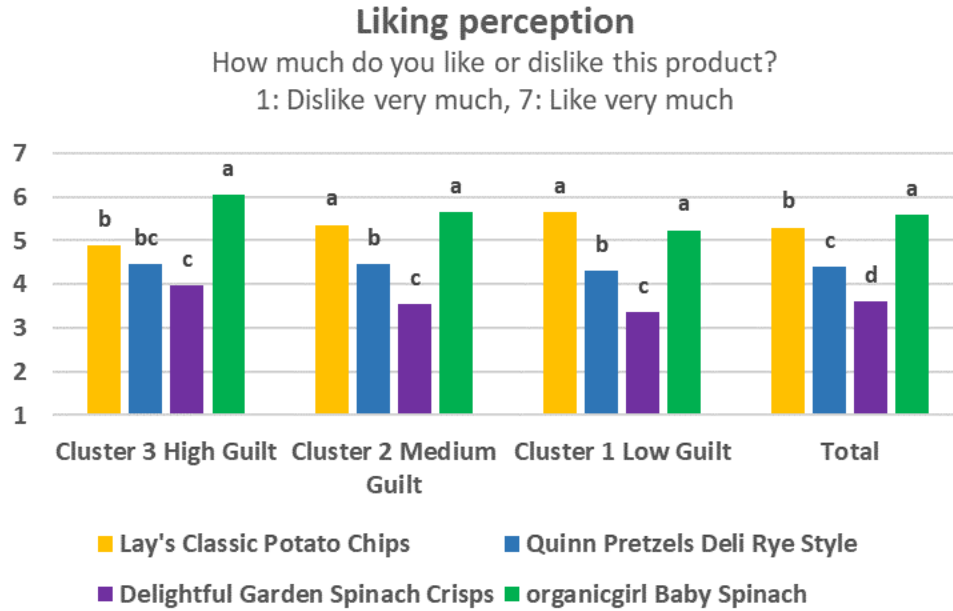


Figure 3.7: Comparison of liking pattern among clusters: Study B

users (at least consume once every week) after tasting.

Rating on guilty perception with 7-pt scale:

Box plot of rating on Guilty perceptions (Figure 3.8) across all consumers suggested that significant variance existed for evaluations on the three products, with interquartile range all differed as 2. However, consumers were very consistently rating organicgirl Baby Spinach as no guilty at all, as 80% the consumers rated spinach as no guilty at all (1 out of 7). Even though the mean value (labeled as a red plus) suggested that on average consumers have a consistent opinion on which product makes them feel guilty or less guilty, it seemed that a continuum existed in rating guilty perception.

The consistent result was further found out by checking if different clusters rated on the guilty level differently, as shown in Table 3.10: Significant differences were found among the three clusters on rating guilty perception for product Lay's Classic Potato chips and Quinn Pretzels Deli Rye Style. For both products, cluster 3 (high guilt tendency segment) consumers gave the most top guilty scores, following by cluster 2 and cluster 1. For products with less guilt

perception (spinach crisps), no significant difference found on guilt score between cluster 2 & 3, with cluster 2, directly gave the highest guilt rating score. And Cluster 1 rated significantly lower than cluster 2. No significant difference was found about rating on the spinach; most consumers considered it no guilt, same trend as observed in box plots (Figure 3.8). In brief, no matter which cluster consumers were assigned in, there were products everyone agreed that make them feel guilty or not guilty at all.

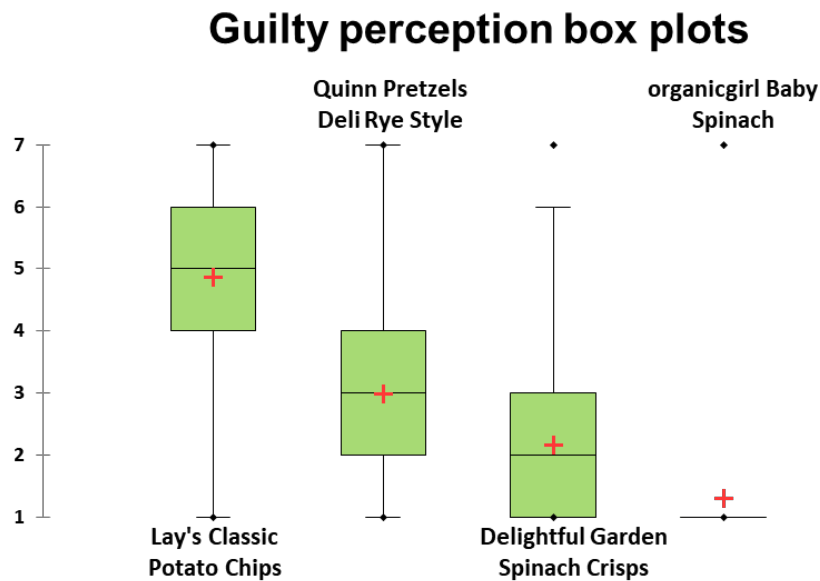


Figure 3.8: Boxplot of rating on Guilty perception: Study B

By reviewing the Guilty pattern among clusters from Figure 3.9, it could be found that more discriminating scores were given on products that could easily elicit guilt (e.g., Potato chips and Quinn Pretzels) among the 3 clusters. On the opposite, no matters consumers were defined from which segments, they were in consensus on rating spinach as not guilty at all.

Rating on processed level and healthy perception with 7-pt scale:

Consensus achieved in rating Healthy perception & Processed level cross clusters, except for Lay's Classic Potato Chips, as shown in Table 3.10: There was no significant difference in rating each products' processed level and healthy perception by comparing among the three clusters for all products, except for product Lay's Classic Potato chips. Cluster 2 and Cluster 3 rated Lay's

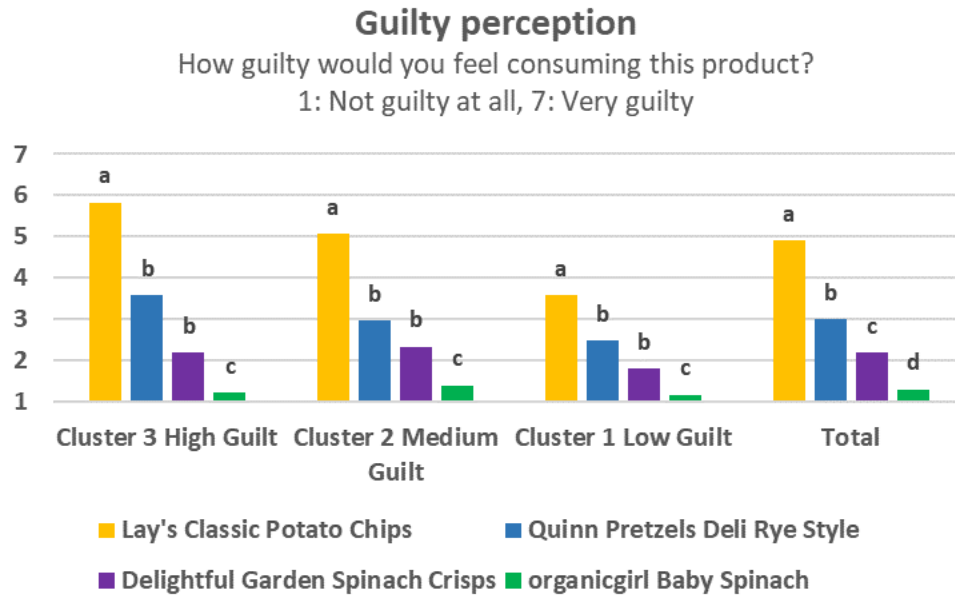


Figure 3.9: Comparison of pattern for rating on Guilty perception among clusters: Study B

Classic Potato Chips higher score on Processed level and a lower score on its Healthy perception compared to Cluster 1.

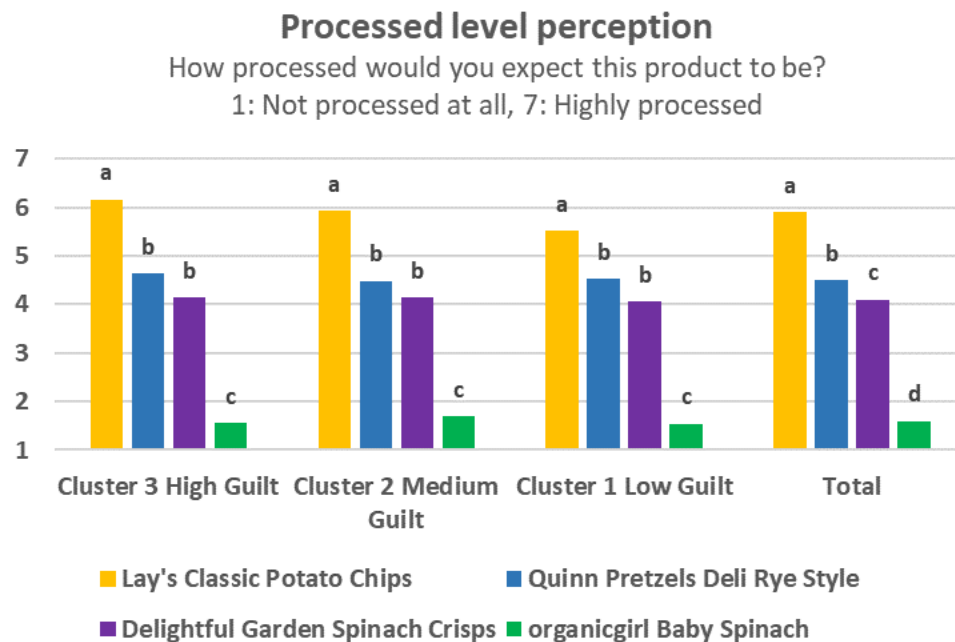


Figure 3.10: Comparison of pattern for rating on Processed among clusters: Study B

By reviewing the pattern in rating Processed and Healthy perception among clusters from

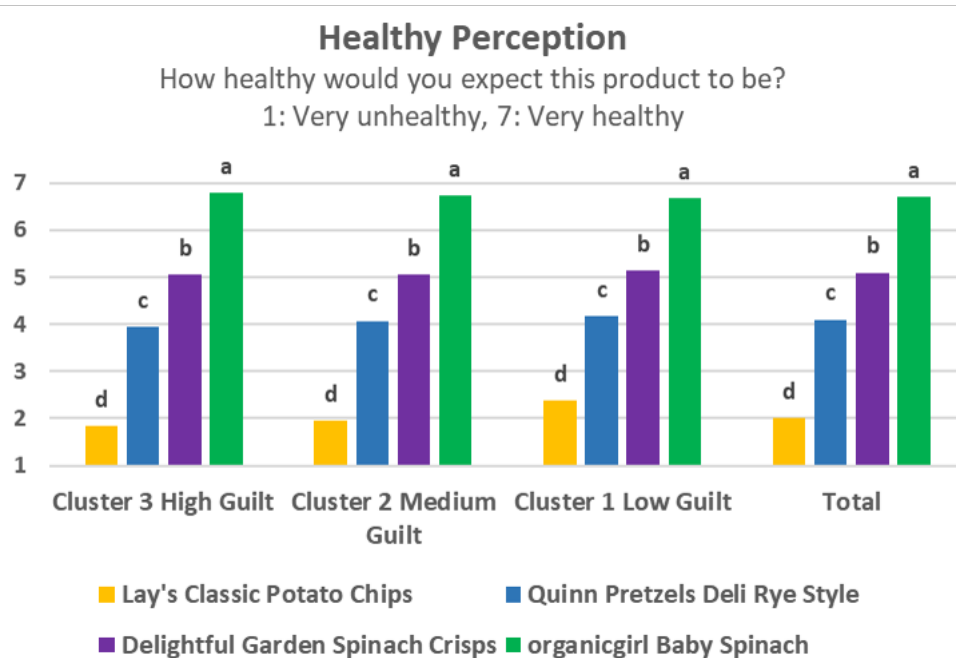


Figure 3.11: Comparison of pattern for rating on Healthy among clusters: Study B

Figure 3.10 and Figure 3.11, it shows that consensus was achieved in rating Healthy perception & Processed level cross clusters. This suggested that consumers' knowledge of processing and healthiness are consistent. Therefore, the variance of guilt may come from something else.

Rating on potential eating frequency with 7-pt scale:

Discriminating scores were found for products rated as high guilt and no guilt at all, but not as much for products in the middle (Table 3.10). The significant difference was found for potential eating frequency on products Lay's Classic Potato Chips and organicgirl Baby Spinach among all three clusters. Cluster 1 with low guilt tendency segment consumers rated that they would eat the potato chips more frequently than cluster 3, in the opposite, they would eat less often the spinach than cluster 3. In addition, there were no significant differences found among the clusters in rating their eating frequency for product Quinn Pretzels Rye Style. For the rating score on product Delightful Garden Spinach crisps, similarly as the rating on liking, a significant difference was only found between cluster 1 & 3 consumers with high guilt tendency consumers expressed would eat it more often than consumers from low guilt tendency.

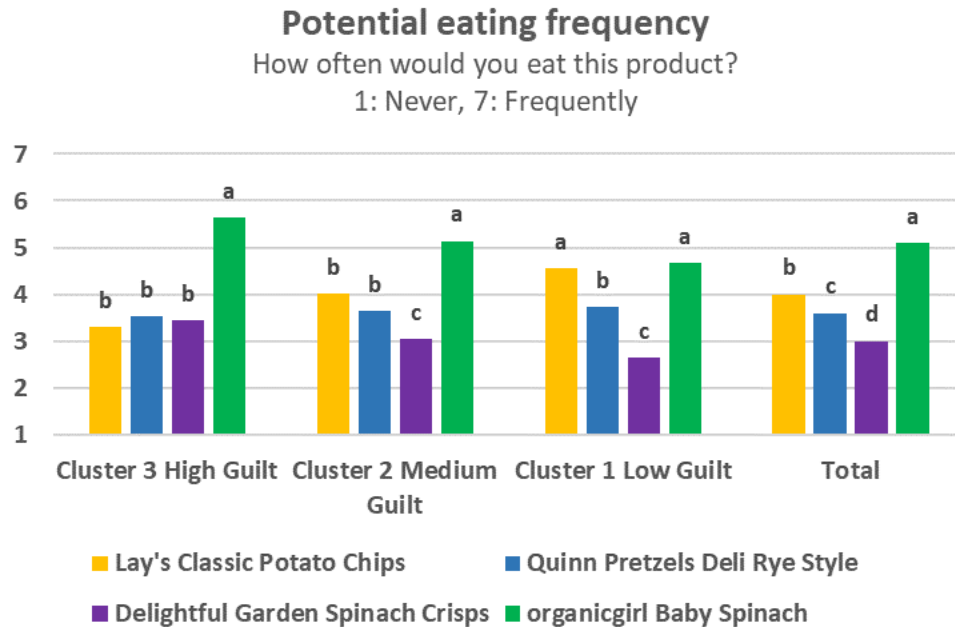


Figure 3.12: Comparison of pattern for rating on Potential eating frequency among clusters

By reviewing the pattern on rating potential eating frequency for the products among each cluster from Figure 3.12, it could be seen that no matter if by average or by each cluster, organicgirl Baby Spinach was rated the highest score on potential eating frequency. For consumers assigned in cluster 3 with high guilt tendency, there were no significant differences in terms of their eating frequencies among the products, except for the spinach product. And the potato chips was rated directly the lowest score among the products. Consumers with high guilt tendency expressed a strong eating inclination for the healthy and not guilty at all products. On the opposite, for consumers from cluster 1 who have low guilt tendency, they rated the potato chips nearly as high as the spinach for expected eating frequency, and they differentiated significantly between the rest of the samples in terms of eating frequency. Consumers from cluster 2, were in between cluster 1 and cluster 3, as they were not discriminating between the potato chips and the Quinn Pretzels. In brief, it seems that consumers with high guilt tendency would only eat spinach more frequently and considered eating the others at the same frequency. On the opposite, cluster 1 consumers would consume the products at different rates.

Brief

Consumers segmented in different guilt clusters have different preference patterns on the products they like the most. For example, cluster 1 with low guilt tendency like Lay's potato chips the most, however, among the other two clusters, the average score showed that the spinach product was liked the most. In addition, a significant difference was found for liking on Lay's Classic Potato Chips between cluster 3 and cluster 1&2; it was more liked by cluster 1&2 (low and medium guilt tendency) than the other cluster 3 (high guilt tendency). All consumers were very consistent in the rating about which product is no guilt for them. 80% of the consumers rated Spinach as no guilty at all. On the other hand, consumers who were defined as high guilt tendency gave a more discriminating rating on products' guilty level. Overall, more discriminating scores were found on products Potato chips and Quinn Pretzels among the 3 clusters than average rating from total consumers. All consumers' knowledge of processing and healthiness was consistent, which means no significant differences found among clusters. This suggested that the variance of guilt might come from something else.

3.7 Limitations

The developed new scale was cross-validated by tested with two different samples of subjects. However, there was no assessment of the construct's stability, as the scale was not administered to the same sample of subjects twice with a certain days interval. It could be argued that the structure that came from the factor analysis was not consistent with the initial structure proposed as categorized from the focus group discussion. However, neither of the two structures was wrong. Instead, it justified the value of the underlying structure of the scale. There were two aspects of a scale's discriminating capability. In this study, the newly developed scale was found could segment consumers into 3 clusters with different guilt tendencies concerning food, and the three groups differed in rating the 16 items in the scales. Next, how the consumer segments would differentiate in terms of their food choice and eating behavior were explored by checking how differently they perceived the products. In future studies, the research focus will

transfer from understanding consumers' guilt tendency to product features' design. To explore how different product characteristics may affect on product's guilt perception.

3.8 Conclusion

A Food Consumer Guilt Scale (FCGS) for measuring consumers' guilt tendency concerning food was developed, and its construct validity was investigated. The scale was constructed with four dimensions of items covering the distinct experience consumers may have with food. The underlying structure of the scale uncovered has three aspects with decreasing effect. 1, consumers' eating behavior, including perceived unhealthiness of food and less unhealthy eating style; 2, the naturalness of the food and its packaging; 3, a sustainable and healthy lifestyle. The FCGS was found to be a reliable measurement instrument and had been cross-validated with two different samples of consumers. It possessed discriminating and predictive validity, which provided a new angle in segmenting consumers based on their guilt tendency concerning food for potentially various applications in market insight and new product development.

Consumers defined with different guilt tendencies were found to have different preference patterns on products they like the most. For example, consumers with low guilt tendency like Lay's potato chips the most, however, among the other two clusters and across all consumers, the spinach product was liked the most. This was because a significant difference was found for liking on Lay's Classic Potato Chips between cluster 3 and cluster 1&2; it was more liked by cluster 1&2 (low and medium guilt tendency) than the other cluster 3 (high guilt tendency). No matter which cluster consumers were assigned with, there were products all consumers agreed that was guilty or not guilty at all. For example, all consumers were very consistent in the rating about which product is no guilt for them. 80% of the consumers rated Spinach as no guilty at all. On the other hand, consumers who were defined as high guilt tendency gave a more discriminating rating on products' guilty level. All consumers' knowledge of processing and healthiness was consistent, which means no significant differences found among clusters. This suggested that the variance of guilt might come from other features of the products, which indicated the need for building a food product guilt scale in the future. Last but not least, consumers with

different guilt tendency showed different potential eating frequency on products, indicating the developed Food Consumer Guilt Scale would be important in encouraging people to eat more healthy food.

3.9 Acknowledgments

The author would like to thank Edgar Chambers V and Grace Deubler for their help revise the preliminary version of the developed scale. Meanwhile, the successful running of the 2nd on-line survey won't be possible without the guide and support given by Dr. Marianne Swaney-Stueve.

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Chapter 4

Development and Validation of the Food Product Guilt Scale

4.1 Abstract

The purpose of this study was to develop a Food Product Guilt Scale to measure how product characteristics affect guilt perception. A preliminary questionnaire was constructed and tested through an online survey. Reliability, discriminating capability, and correlation with the product's guilt perception was evaluated to refine the items. A final 14-item measure was found to be a reliable measurement instrument possessing discriminating validity and was cross-validated. These findings suggested that the Food Product Guilt Scale could be a useful tool in generating insight on understanding how to design the product features to optimize guilt perception related to products. Moreover, it was found that there was no clear relationship between guilt rating and perceived liking of the products. Emotional terms positively related to guilt were identified as Regretful, Irresponsible, Lazy, Unproductive, Bloated, Heavy, Gross, Terrible, whereas, negatively related emotional words were Healthy, Natural, Good, Balanced, Energized, Refreshed, Energetic, Productive, and Sustained. Intrinsic product characteristics, such as nutritional values were the main contributors to tested products' guilt perception.

Keywords: Guilt, Scale development, Product development, Multiple Factor Analysis

4.2 Introduction

4.2.1 Background

In the past years, there has been an increase in snacking, 47% of the U.S. consumers eat more than three snacks per day ([Information Resources Inc., 2019a](#)). Research data show that consumers are eating snacks throughout the day ([Information Resources Inc., 2019b](#)): Compared to the year 2010, the snacking frequency was 26% in 2019, which has increased more than three times for early morning occasion, and nearly doubled for a late evening occasion, reaching 40%.

The truth is, eating healthily is just one of the holistic approaches consumers take to keep them well. Food & Beverage was ranked the third product category, following Health care and Personal Care categories, with 82% of the consumers agreeing on it as part of their practices for self-care ([Information Resources Inc., 2018](#)). Health and Wellness have been valued as a \$450 billion market in the U.S., covering multiple Consumer packaged Goods (CPG) categories ([Information Resources Inc., 2018](#)). Globally, a wellness economy, which encompasses industries that enable consumers to incorporate wellness activities and lifestyles into their daily lives, has witnessed a continuously expanding and being estimated at \$4.5 trillion ([Global Wellness Institute, 2019](#)) in the year 2019 versus \$4.2 trillion in the year 2017 representing 5.3% of 2017 global economic output. Among it, Healthy Eating, Nutrition, and Weight loss sector were estimated for \$702 billion ([Global Wellness Institute, 2018](#)).

Not only being more mindful of their health and wellness management, but conscious consumers have also been concerned with animal welfare as well as the possible negative environmental impacted by mass industrial production. For example, there is demand for plant-derived ingredients like meat and dairy alternative, oppose animal testing, seek for grass-fed or pasture-raised product features, etc. Over the past few years, consumers' awareness of ocean pollution has gained momentum, which is reshaping consumers' expectations and affecting the behavior towards packaging. Consumers are becoming more sensitive towards plastics, especially single-use packaging for either food or non-food categories, and more frustrated with over-packaged goods coming together with the fast developed e-commerce. Globally, con-

sumers are showing potential willingness to pay more for environmentally conscious or eco-friendly products, as well as recyclable packaging based on an international lifestyle survey ([Euromonitor International, 2019a](#)). The latest 2020 Top 10 consumer trends revealed that reusable packaging initiatives were happening among young generations ([Euromonitor International, 2020](#)).

On the one hand, the government is seeking insights on promoting healthy and sustainable eating behaviors among the public. On the other hand, food companies that committed to launching new healthy products are trying hard to decode product design to delight the consumers. To gain a portion of the growth in the snack category, companies disrupted their way of getting to know their consumers. In 2018, PepsiCo partnered with Black Swan Data to develop "360 Always on-trend engine", applying machine learning on social media to understand consumers' engagement with food ingredients, brands, and products for better prediction ([Euromonitor International, 2019b](#)). Communicating ambitious corporate goals of promoting sustainable values ([Danone, 2018](#)) and investing in new product development by adding features addressing wellness and sustainability only represent a few strategies companies leveraged. Nevertheless, benefits claims such as non-GMO, no artificial colors, gluten-free, and organic, seemed winning consumers ([Information Resources Inc., 2017](#)). With increasing product features designed addressing health, wellness, and sustainability, how well these claims influence on consumers' emotions and their food choice need to be researched.

It was shown that guilt could lead consumers to take the paths embracing a sustainable lifestyle. Not only in seeking physical well-being and mental health solutions for themselves but also showing more empathy caring to the world beyond, which includes other people, animals, and the environment ([Antonetti and Maklan, 2014](#); [Mishra and Mishra, 2010](#)). Prior research found that consumers with different guilt perceptions have different preference patterns and potentially diverse eating frequencies of snack products, and suggested the importance of understanding how different product features impact guilt perception (Chapter. 3). A previous study (Chapter. 2) found that the factors related to the product could elicit guilt, including intrinsic and extrinsic product characteristics. Not only nutritional values like high fat, high sugar, and high salt will make consumers feel guilty, but also ingredients, claims, price, product

name, and packaging could lead to consumers' different levels of guilt perceptions on the products. Moreover, it has been shown that guilt perception gives a new perspective of differentiating food and beverage products; white space of guilt-free pleasure snacks has been identified (Chapter. 2). In brief, a prior study (Chapter. 2) demonstrated that measuring how different product characteristics affect consumers' guilt perception on the product is a viable concept.

Several studies have shown how product-evoked emotions can provide useful and actionable data that sensory and liking judgments can not (Desmet and Schifferstein, 2008; King and Meiselman, 2010; Ng et al., 2013a,b). Emotional responses to consumer products may be a decisive factor in purchase decisions, which explained why advertisements often focus on the 'emotional benefits' rather than on the technological benefits(Desmet, 2002). The profile of emotions in a general guilt situation was summarized in a decreasing effect: distress, fear, interest, shyness, anger, surprise, and joy (Izard, 1977). This suggested the emotion construct that could accompany guilt. However, concerning food, what different emotional constructs might highly correlate with guilt will need to be explored.

Understanding the simple pleasure of sensory properties of food is necessary, but not sufficient in reliably predicting food choice or purchase; therefore, maybe other constructs will (Prescott, 2017). Cardello showed that a significant correlation existed between liking and certain positively valanced emotions: pleased, satisfied, good, and glad (Cardello et al., 2012). Some research showed that emotions and liking ratings do not always agree (King et al., 2010; Porcherot et al., 2010). Understanding how a product's guilt rating correlated with liking and other criteria would be fundamental for understanding its impact on consumers' food choices and eating behaviors.

New product development has been well recognized as one of the essential strategies to help build a company's competitive advantage and long-term financial success in global food markets (Costa and Jongen, 2006). When it comes to the function of Sensory science, understanding how product characteristics affect product-evoked emotions would be critical in generating insight on product design. Multiple Factor Analysis was widely used for analyzing Napping data (Lê and Worch, 2014). Besides that, it was dedicated to data sets where variables are structured into groups that have been applied in many fields to study the links between the sets of vari-

Table 4.1: Structure of the Preliminary Questionnaires

Section	Phase	Item	Scale
Products related questionnaire	Phase I	8 questions	7-pt likert scale with different anchors
	Phase II	15 items	7-pt likert scale (strongly disagree = 1, strongly agree = 7)
	Phase III	30 terms	CATA

ables, for example, Genomic ([Tayrac et al., 2009](#)) and sensory analysis ([Pagès, 2004](#)).

4.2.2 Research goal and objectives

The goal of the study was to gain insight into developing new healthy & sustainable snack food products by carrying the following two studies: The objectives of Study A were to: (1) Develop and validate a preliminary questionnaire for evaluating product characteristics' effect on the guilt perception; (2) Explore the relationship between guilt rating and other ratings; (3) Build an emotional construct highly correlated with guilt rating. The objectives of Study B were to: (4) Validate the above items with an updated questionnaire; (5) Understand the association between product features and their emotions profile.

4.3 Methodology of Study A

4.3.1 Preliminary questionnaire construction

A preliminary product-related questionnaire (details in Appendix [G](#)) was generated based on learning from prior focus group discussions. Its structure included 3 phases (Table [4.1](#)).

Phase I: Basic general questions related to products

Hedonic liking has been used widely in industry and academia for investigating consumers' acceptance of products, but not necessarily could predict real-life purchase behavior. It would be interesting to understand how product-related guilt perceptions correlate with the product's liking. Evidence from the sorting task in prior FGD showed that multiple criteria had been used

together with guilt perception by consumers in grouping the products. Among the criteria used, some of them distinguished and explained the first three dimensions of the product map, which included the willingness to try, purchase intent, health, and processing level they associated with the product, as well as the amount and frequency they would consider eating the product. Therefore, seven other questions were designed to identify the relationships between the above criteria with guilt responded to product stimuli. 7-point Likert scales with different opposite anchors points were used for phase I .

Phase II: Preliminary Food Product Guilt Scale

Phase II will help understand how the product characteristics affect guilt. A total of 15 items were included in the preliminary Food Product Guilt Scale, covering the intrinsic and extrinsic product characteristics which may have effects on product's guilt perception. Among them, items 1-6 relate to different aspect of nutrition values, items 7 represents food categories in general, items 8-10 represent ingredients, item 11 for claims, item 12 relates to price, item 13 for product name, and items 14,15 for using and packing. 7-point Likert scale (strongly disagree = 1, strongly agree = 7) was used for collecting the data.

Phase III: Identify the emotional construct correlated to guilt concerning food products

A total of 30 terms were collected from consumers' sharing from prior FGD. Check all that apply (CATA) questions was used for testing.

The initial preliminary questionnaire was revised by two native English speakers to reformulate confusing items. The resulting questionnaire was pilot tested with eight students. The final preliminary questionnaire (Appendix.G) was launched as an on-line survey through Redjade software (Redjade[®], Redwood Shores, CA, USA).

4.3.2 Consumers

The preliminary questionnaire was administered to consumers from the Center for Sensory Analysis and Consumer Behavior database at Kansas State University (Manhattan, KS, USA) and

via K-State Newsletter. Consumers knew that all participants who completed the survey would be entered into a drawing for one of five \$100 cash prizes. Screening criteria were expanded from FGD, in which consumers aged from 18 to 74 years old with some college or university graduate degree would pass the screener and take the on-line survey. Demographic characteristics collected included annual household income, as well as the number of adults and children living in their household. Screener criteria were detailed in the Appendix. D. Among the 315 respondents collected, 10 did not complete the preliminary questionnaire; their incomplete answers were removed. Therefore, 305 responses were included in the analysis.

4.3.3 Stimuli & Test design

A total of 9 products representative from the product mapping in the prior study (Chapter 2) were tested by showing the product photo with 2-3 short claim descriptions (Table 4.2).

It was estimated that answering all the questions from the survey should take less than 12min. Consumers randomly tested 3 out of 9 products in an incomplete block design. Williams Square (a subset of Latin Square) was used in Redjade to create the design. With nine products in Williams Square, the incomplete block was balanced every 18 rows.

The products were tested in a sequential monadic order. Product photos with claims were shown on the screen when consumers answered each of the questions related to products.

4.3.4 Data analysis

Items A4, A7, A13, and A14 were stated negatively, therefore, for analysis, scoring on the scales for the negatively stated items were reversed. To understand (1) relationships of rating on products' guilt perception to other questions, (2) which product characteristics, as well as the emotional terms highly correlated to guilt, correlation analysis was run. Pearson correlation test was performed using function `rcorr()` from package `Hmisc` in R version 3.6.2 (R Core Team, Vienna, Austria). The correlation matrix graph was produced using function `corrplot()` from package `corrplot` in R. Insignificant coefficient were added with crosses. Positive correlations were displayed in blue and negative relationships in red color. Color intensity was proportional to the

Table 4.2: Test Stimuli in Study A

Test Stimuli	
organicgirl Baby Spinach  • Family Size • We washed it 3 times, so you don't have to • 100% Recycled Plastic	Harmless Coconut Water  • 32 fl oz, \$9.99 • Organic • Fair for life
Hormel Fully Cooked Bacon  • Ready to Eat Bacon • Gluten Free • Shelf Stable	Beyond Meat Plant-based Burger Patties  • 20g of Plant Protein per serving • Soy free • Ingredients: Water, Pea Protein Isolate, Expeller-pressed Canola Oil, Refined Coconut Oil, contains 2% or Less of the Following: Cellulose from Bamboo, Methylcellulose, Potato Starch, Natural Flavor, Maltodextrin, Yeast Extract, Salt, Sunflower Oil, Vegetable Glycerin, Dried Yeast, Gum Arabic, Citrus Extract (To Protect Quality), Ascorbic Acid (To Maintain Color), Beet Juice Extract (For Color), Acetic Acid, Succinic Acid, Modified Food Starch, Annatto (For Color).
Häagen-Dazs Coffee Vanilla Ice cream  • Silky Vanilla Ice cream • Crispy Belgian Chocolate layers	Lay's Classic Potato Chips  • Made with three ingredients: potatoes, oil and salt • Gluten free • Treats fun to enjoy at lunch, as an after school snack or party refreshment
Delightful Garden Spinach Crisps  • Calories per serving size (30g): 110 Kcal • Made with 52% fresh baby spinach and all other organic ingredients	Quinn Pretzels Deli Rye Style  • Whole Grain • First ingredient is sorghum • Farm to Bag promise
meiji The Chocolate  • Comfort Bitter • Deep Nutty taste • Bean to Bar	

correlation coefficients. To understand how products differentiated in terms of 8 basic questions, a two-way analysis of variance (ANOVA) was performed using products and subjects as factors in XLSTAT (XLSTAT, New York, NY, US) with Tukey's HSD post hoc test at confidence level of 95% to determine significant differences. Two-way ANOVA was performed instead of one-way ANOVA because each product was subjected to different subjects.

4.4 Results & Discussion of Study A

4.4.1 Demographic

The sample (Table 4.3) consisted of 17% Males and 83% Females. The sample balanced well in terms of age group: 33%, 31%, and 35% aged between 18-34yr, 35-54yr, and 55-74yr, respectively. Education level was balanced well too, with 44% has completed a college degree, 32% has either Master or Doctoral degrees, 17% has some college but no degree and 7% for Professional degree or completed Technical school. Regarding marital status, 65% of subjects reported having two adults live in the house, 20% were single, 15% had three or more adults live in the house. The majority, 72% of subjects reported no children under 18 living with them. Among the subjects reported having children live with them, 12% had one child, 11% had two children, and 4% reported three children live in the household. More consumers with children will need to be recruited for Study B. The reported household annual income was distributed as follows: <\$40,000, 24%; \$40,000-\$79,000, 36%; \$80,000-\$149,999, 36%; >\$150,000,4%.

4.4.2 Preliminary questionnaire test result

Median time spent by consumers answering the product related questionnaire was 8min 39sec.

Phase I: Basic questions related to products

Relationship between guilt and other basic questions

The correlation matrix between basic general questions and the preliminary Food Product

Table 4.3: Summary of Consumer Demographics: Study A

Demographic Profile	Panel Composition	
	Count	%
<u>Gender</u>		
Female	254	83%
Male	51	17%
<u>Age</u>		
18-34	105	33%
35-54	94	31%
55-74	106	35%
<u>Education</u>		
Some college but no degree	52	17%
College degree	135	44%
Master or Doctorate degree	98	32%
Prdofessional degree or Technical school	20	7%
<u>Income</u>		
\$0 - \$ 19,999	27	9%
\$20,000 - \$39,999	47	15%
\$40,000 - \$59,999	51	17%
\$60,000 - \$79,999	59	19%
\$80,000 - \$99,999	51	17%
\$100,000 - \$149,999	58	19%
\$150,000 or more	12	4%
<u>Adults in household</u>		
1	61	20%
2	199	65%
3	27	9%
4 or more	18	6%
<u>Children in household (Below 18)</u>		
None	221	72%
1	37	12%
2	33	11%
3 or more	14	4%

Table 4.4: Least square means from ANOVA for general basic questions: Study A

Products	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
Lay's Potato Chips	5.2 ab	5.4 a	3.7 ab	3.7 b	4.3 a	4.4 a	5.6 ab	2.2 e
Hormel Fully Cooked Bacon	3.8 cd	3.8 bc	2.7 cde	2.7 d	3.1 cd	4.0 a	6.1 a	2.5 e
Häagen-Dazs Coffee Vanilla Ice cream	5.3 a	4.9 a	3.1 bcd	3.1 bcd	3.6 bc	4.0 a	5.0 bc	2.4 e
meiji The Chocolate	3.7 cd	3.8 bc	2.4 de	2.5 de	2.7 de	3.0 b	4.1 d	3.7 d
Quinn Snacks Pretzels	4.4 bc	4.6 ab	3.3 bc	3.5 bc	3.8 abc	2.6 bc	4.3 cd	4.2 cd
Beyond Meat Plant-based Burger Patties	3.1 de	3.2 cd	2.3 ef	2.4 de	2.6 de	2.5 bc	5.5 ab	4.4 bc
Harmless Coconut Water	2.9 e	2.3 d	1.8 f	1.9 e	2.3 e	2.4 bc	3.2 e	4.8 bc
Delightful Garden Spinach Crisps	3.8 cd	3.8 bc	2.8 cde	2.9 cd	3.2 cd	2.1 c	3.9 d	4.9 b
Organicgirl Baby Spinach	5.4 a	5.5 a	4.4 a	4.5 a	4.1 ab	1.3 d	1.8 f	6.4 a

abcdef: Different letters within a column indicated statistically significant differences ($p < 0.05$) based on Tukey's test

Guilt Scale items was shown in Figure 4.1. Results showed that a significant positive correlation was found between guilt with the product's Processed perception ($r=0.46$). In the opposite, a significantly negative correlation was found between guilt with the product's Healthiness perception ($r=-0.59$). Perceived eating frequency ($r=-0.22$) and perceived liking ($r=-0.12$) were found to have significant but very weak relationships with the product's guilt perceptions. Questions about products' perceived liking (Q1), willingness to try (Q2), potential purchase frequency (Q3), and possible eating frequency (Q4) were highly positively correlated, and validated the learning from the prior qualitative study (Chapter 2). To sharpen the questionnaire for Study B, eliminated Q2, and Q3. In this study, consumers were not tasting the products; the product's hedonic liking question was just a perceived value based on the product information provided. It was kept to explore its relationship with the rating on the product's guilt perception. Q5 was eliminated for Study B, as a very low relationship identified with guilt. Therefore, five items were kept to be tested in the 2nd survey, items Q2, Q3, Q5 were removed.

Product perception

Significant differences were found on all the tested general questions across the nine samples. Consistent with the correlation results, rating on the product's guilt perception positively

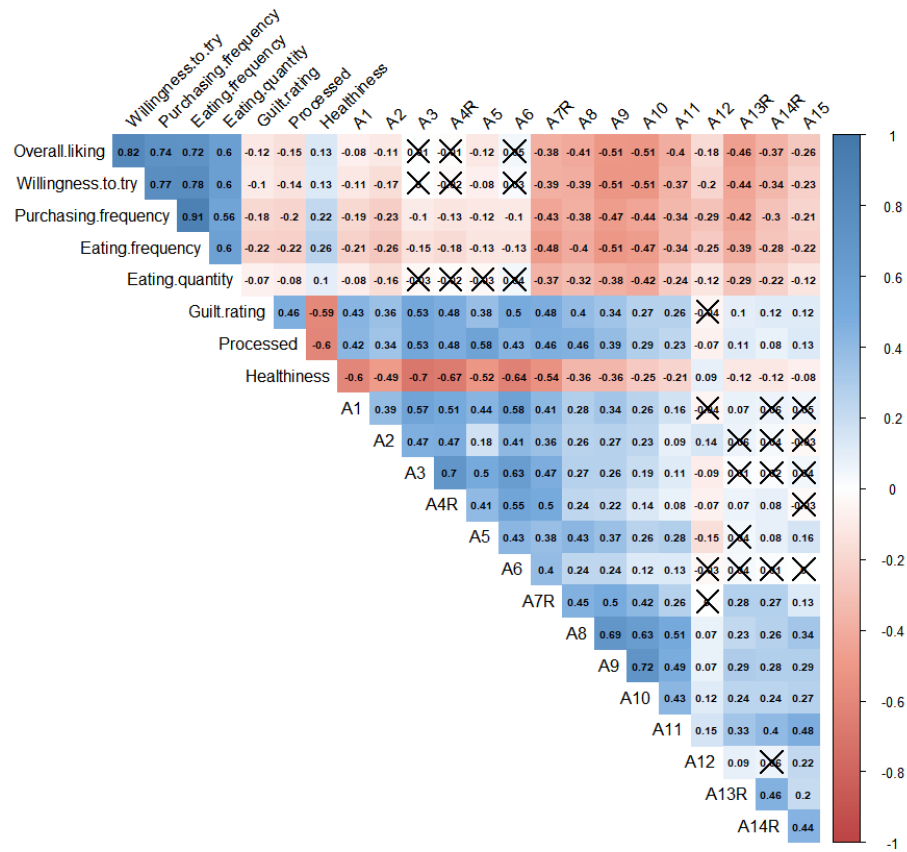


Figure 4.1: Correlation matrix between basic general questions and the Preliminary Food Product Guilt Scale items: Study A

correlated with the product's perceived processed level but negatively correlated with the product's perceived healthiness level. Least square mean scores of the guilt rating ranged from 1.3 to 4.4 on the 7 point scale with end anchor labeled as 1: not guilty at all and 7: very guilty. It indicated that on the average the tested products did not elicit strong guilt perception.

Understanding product-related guilt perceptions were necessary for product developers to optimize the products, as this need would not be fulfilled just by asking consumers to give guilt scores on products directly, even though ratings on guilt differentiated between the products significantly. However, how the product's features affect it, was unknown. This justified the need for the Food Product Guilt Scale to understand how different product characteristics impact on product's guilt perception.

Four products from different guilt levels were selected to be tested in Study B with a Randomized Complete Block Design:

- Lay's Potato Chips
- Quinn Snacks Pretzels
- Delightful Garden Spinach Crisps
- Organicgirl baby Spinach

Phase II: Evaluate how product characteristics affect guilt

As shown in Table 4.1, correlation test results (correlation coefficients were less than 0.2) suggested that with the tested products, guilt has nothing to do with packaging (A14 and A15), price (A12) or name (A13), it has to do with the product itself.

Items A12, A14, A15, were modified to be tested again in the 2nd test, to make sure the impact of price and packaging could be evaluated, and item A13 was kept without changing:

A12. I think this product would be expensive.

A14. I feel bad about the packaging used for this product.

A15. I think this product as over-packaged.

Phase III: Identify the emotional construct correlated to guilt in respect of food

A total of 30 emotion terms were tested in study A. Items highlighted with crosses were planned to be eliminated in Study B, as no significant relationship with rating on product's guilt perception (Figure 4.2). Terms of Bossy, Confused, Doubtful, Fun, Rewarded, and Tricked were removed. Therefore, 24 emotional terms were kept to be tested in the next study.

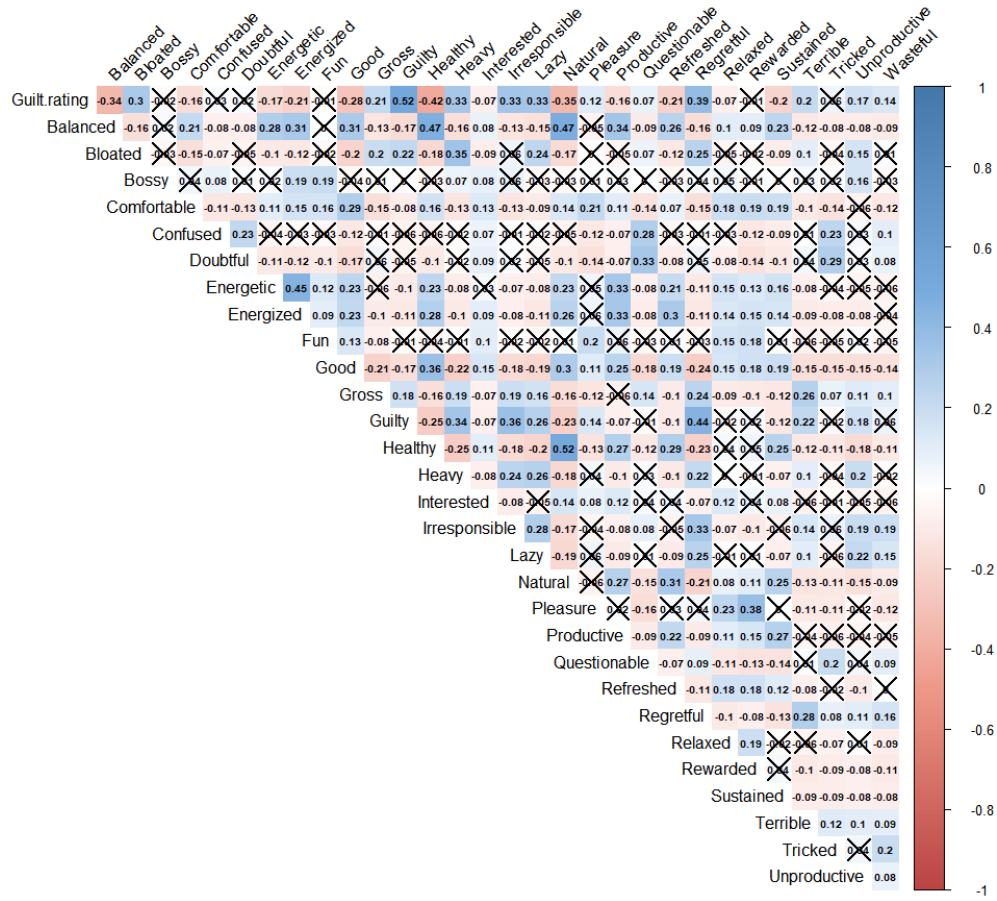


Figure 4.2: Correlation matrix between Guilty rating and the emotion terms: Study A

4.5 Methodology of Study B

4.5.1 Updated questionnaire

Same as Study A, the updated product-related questionnaire (Appendix.H) consisted of 3 phases (Table 4.5): Phase I included 5 basic questions, 7-point Likert scales with different anchors points were used for rating; Phase II included 15 updated items from the Food Product Guilt Scale, which need to be rated on 7-pt Likert scale (Strongly disagree = 1, Strongly agree = 7); In Phase III, an updated list of 24 emotional terms was tested in CATA.

Table 4.5: Structure of the updated questionnaires

Section	Phase	Item	Scale
Products related questionnaire	Phase I	5 questions	7-pt likert scale with different anchors
	Phase II	15 items	7-pt likert scale (strongly disagree = 1, strongly agree = 7)
	Phase III	24 terms	CATA

4.5.2 Consumers

Similar consumer screening criteria were used as in Study A, except for the quality check: Consumers who checked the option of swimsuit for answering the question which products they have purchased in the last 30 days at a grocery store or supermarket were not eliminated. Consumers from the center's database at Kansas State University (Olathe, KS, USA) live in the Kansas City area were invited to take the screener by email sent through Compusense Cloud (Compusense, Inc., Guelph, Ontario, Canada). A different sample of consumers was used to test the updated questionnaire. A total of 458 consumers finished taking the screener (only 12 dropped). Among them, 444 qualified: 4 did not start taking the survey, partial results was 23 and 417 consumers completed the survey (Table 3.5).

4.5.3 Stimuli

Four products identified from Study A could elicit different guilt levels that were selected to test in a Randomized Complete Block Design. Products were tested in sequential monadic order. Products photos with 2 to 3 claims describing the products were shown on each page together with questions asked related to products. Table 4.2 listed all products.

- Lay's Classic Potato Chips
- Delightful Garden Spinach Crisps
- Organicgirl Spinach
- Quinn Snacks Pretzels

4.5.4 Data Analysis

Items A4, A7, and A13 were reversed before performing any analysis. Internal consistency reliability evaluation across all tested samples using Cronbach's Alpha measure was performed with `alpha()` function in `psych` package in R version 3.6.2 (R Core Team, Vienna, Austria) to estimate how consistent the results were for the 15 items within the scale developed. To evaluate the scale's discriminating capability, one-way ANOVA was performed in XLSTAT to identify if ratings on each item could differentiate among the products with Tukey's HSD post hoc test at a confidence level of 95% to determine significant differences. To understand how different consumer segments in different guilt tendencies may rate differently on tested products, one-way ANOVA was performed in XLSTAT to identify if significant differences existed for the ratings among the products with either product or cluster set as a factor. Next, Pearson correlation was run in R to understand 1, which product characteristics as well as the emotional terms highly correlated to guilt; 2, relationships of rating on products' guilt perception to other questions. The correlation matrix was reordered according to the correlation coefficient. Correspondence analysis using `CA()` function from the `FactoMineR` package was performed in R to understand how different emotional terms associated with the products. To explore the association between the emotional terms and the product features, Multiple Factor Analysis was applied using the `MFA()` function in R.

4.6 Results & Discussion of Study B

4.6.1 Demographic

The sample included 57% women and 43% men and ranged in age from 18-74 with 23%, 38%, and 39% aged between 18-34yr, 35-54yr, and 55-74yr, respectively. Regarding education level, 48% has completed a college degree, 33% has either Master or Doctoral degrees, 16% has some college but no degree and 3% for Professional degree or completed Technical school. It was stated that 71% have two adults living in the house, 14% were single, 15% had three or more adults live in the house. 58% of subjects reported no children under 18 living with them. Among

the subjects reported having children live with them, 19% had one child, 15% had two children, and 8% reported three children live in the household. The reported household annual income was distributed as follows: <\$40,000, 7%; \$40,000-\$79,000, 30%; \$80,000-\$149,999, 50%; >\$150,000, 13%.

4.6.2 Validation of the updated Food Product Guilt Scale (FPGS)

The mean value and standard deviation value of all items from the updated Food Product Guilt Scale across all tested products and were summarized in Table 4.6.

Reliability analysis on Food Product Guilt Scale

With Cronbach's alpha equaled to 0.88 (> 0.7), reliability analysis run across all samples revealed that acceptable internal consistency was obtained (Urbina, 2014). All items were found to have a high corrected item-total correlation (Table 4.6), except for item A12 (I think this product would be expensive). A low corrected item-total correlation as - 0.13 (< 0.3), indicating price was not crucial for the tested products. Further correlation analysis results showed A12 was negatively related to a guilty perception rating, which explained its negative value.

Table 4.6: Reliability output of the Food Product Guilt Scale cross all samples: Study B

Items	Mean	Standard deviation	Corrected Item-Total Correlation
{Nutritional values}			
A1.I associate this product as not being very nutritious.	3.7	2.2	0.65
A2.I associate this product as having a high sugar content.	2.6	1.6	0.57
A3.I associate this product as having a high fat content.	3.2	2.1	0.70
A4.I associate this product as having a low calorie content.*	3.7	2.2	0.65
A5.I associate this product as having a high sodium content.	4.3	2.3	0.76
A6.I associate this product with tasting good, but not providing any nutritional benefit.	3.6	2.1	0.67
{Food categories & Eating or drinking}			
A7.I could eat a lot of this product, and still feel good. *	3.8	2.0	0.73
{Ingredients}			
A8.I would be concerned with the ingredients used in this product.	2.9	1.8	0.77
A9.I would hesitate to eat this product due to its ingredients.	2.8	1.9	0.69
A10. There are ingredients used in this product I will not consume.	2.4	1.6	0.57
{Claims}			
A11. The claims on the package raise concerns.	2.9	1.7	0.62
{Price}			
A12. I think this product would be expensive.	4.5	1.6	-0.13
{Name}			
A13. The name of this product makes me feel good.*	3.5	1.5	0.44
{Using/Packaging}			
A14. I feel bad about the packaging used for this product.	2.7	1.5	0.44
A15. I think this product is over-packaged.	2.9	1.6	0.42

* indicated scores to be reversed

Although a low corrected item-total correlation was found for item A12, the item was still considered as a must to include in the scale as it could be important for other products to be tested in the future. This brought out the challenge of developing a food product related guilt scale. It has to be flexible for the items to be tested, which means prior qualitative work will be needed before the testing. Therefore, depending on the product category, specific category guilt scales could be developed.

Discriminating capability on Food Product Guilt Scale

Results of one-way ANOVA with Tukey (HSD) as the post hoc multiple comparisons were summarized in Table 4.7. It showed that 11 items could discriminate more than two tested products, and 6 of them could discriminate among all the tested four products.

Table 4.7: Least square means from ANOVA for Product related Guilt Scale items across products: Study B

Products	A1	A2	A3	A4R	A5	A6	A7R	A8	A9	A10	A11	A12	A13R	A14	A15
Lay's Classic Potato Chips	5.9 a	3.1 a	6.0 a	6.1 a	6.4 a	6.0 a	5.4 a	3.6 a	3.4 a	2.5 b	3.2 a	3.1 b	3.9 a	2.9 a	3.0 ab
Quinn Pretzels Deli Rye Style	4.1 b	3.3 a	3.3 b	4.2 b	5.2 b	4.3 b	4.4 b	3.3 b	3.3 a	2.8 a	3.2 a	4.9 a	3.8 a	2.7 b	2.8 bc
Delightful Garden Spinach Crisps	3.0 c	2.5 b	2.4 c	2.9 c	4.1 c	2.7 c	3.7 c	3.2 b	3.2 a	2.8 a	3.4 a	5.1 a	3.7 a	3.1 a	3.2 a
organicgirl Spinach	1.9 d	1.4 c	1.3 d	1.7 d	1.4 d	1.6 d	1.8 d	1.4 c	1.5 b	1.4 c	2.0 b	5.0 a	2.7 b	2.3 c	2.5 c
Discriminating more than 2 samples?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No	No	Yes	Yes

abcd: Different letters within a column indicate statistically significant differences (p <0.05) according to Tukey's test

All the nutritional value related items (A1-A6) were found discriminating to more than two products, indicating that nutritional values were significant for differentiating the tested products. So were the items related to eating (A7R), ingredients (A8, A10), and using & packaging (A14, A15). On the other hand, items related to ingredient (A9), claims (A11), price (A12), and name (A13R) could only discriminate the products into two groups on average. Assessment of discriminating capacity provided a source of validation evidence.

Consumer segmenting analysis of items not discriminating on average from the Food Product Guilt Scale

Since items A9, A11, A12, and A13R were not discriminating a lot among products on average, the research investigated whether consumers segmented based on their different guilt tendency concerning food would differ in rating the items (Table 4.8). Consumers were segmented into three clusters based on their total scale scores calculated from the Food Consumer Guilt Scale (Chapter 3): low guilt tendency (cluster 1), medium guilt tendency (cluster 2) and high guilt tendency (cluster 3).

For consumers defined as high guilt tendency (cluster 3), more discriminating scores were found for ingredient (A9) and product name (A13R) compared to the average rating. For consumers defined as low guilt tendency (cluster 1), they were more discriminating on ingredient (A9) and claim (A11). The same discriminating capability was found for consumers with medium guilt tendencies (cluster 2) compared to the average rating. Regarding rating on item A9 (There are ingredients used in this product I will not consume), the rating pattern for cluster 3 and cluster 1 was the opposite, indicating the ingredients used in products matters a lot to cluster three, and they may not consume the product because of it, as they gave more extreme scores on rating the products. Cluster 3 with high guilt tendency was found more sensitive to the name of the products (A13R); for example, the name of Lay's Classic potato chips made cluster 3 consumers felt worse than cluster 1.

Directly, cluster 3 was found to have more concerns regarding claims than cluster 1 for the familiar products based on their ratings on item A11 (The claims on the package raise con-

Table 4.8: Least square means from ANOVA for rating on Food Product Guilt Scale items between products under clusters: Study B

Cluster	Rating	Lay's Classic Potato Chips	Quinn Pretzels Deli Rye Style	Delightful Garden Spinach Crisps	organicgirl Baby Spinach	Discriminate >2 products
Cluster 3 - High Guilt	A9	4.2 a	3.6 b	3.1 b	1.5 c	Yes
	A11	3.6 a	3.3 a	3.4 a	1.9 b	No
	A12	3.2 b	5.0 a	5.1 a	4.7 a	No
	A13R	4.1 a	3.6 b	3.5 b	2.3 c	Yes
Cluster 2 - Medium Guilt	A9	3.5 a	3.2 a	3.3 a	1.5 b	No
	A11	3.4 a	3.3 a	3.5 a	2.1 b	No
	A12	3.3 b	4.9 a	5.2 a	5.1 a	No
	A13R	3.9 a	3.9 a	3.8 a	2.8 b	No
Cluster 1 - Low Guilt	A9	2.5 b	3.0 ab	3.2 a	1.5 c	Yes
	A11	2.6 bc	2.9 ab	3.2 a	2.0 c	Yes
	A12	2.7 b	4.8 a	5.0 a	4.9 a	No
	A13R	3.6 ab	3.8 a	3.8 a	3.1 b	No
Total	A9	3.4 a	3.3 a	3.2 a	1.5 b	No
	A11	3.2 a	3.2 a	3.4 a	2.0 b	No
	A12	3.1 b	4.9 a	5.1 a	5.0 AM	No
	A13R	3.9 a	3.8 a	3.7 a	2.7 b	No

abc: Different letters within a row indicate statistically significant differences ($p < 0.05$) according to Tukey's test

cerns). By checking the rating score on item A12 (I think this product would be expensive), the pattern of rating on price was close across clusters and on average. As consumers might consider their familiar potato chips product would be cheaper than the other products.

Correlation analysis to identify which product characteristics elicit guilt

The correlation matrix between basic general questions and the Food Product Guilt Scale items was shown in Figure 4.3. The critical issue under-explored here was to validate again if all developed items highly correlated to guilt perception rating. All tested 15 items were found correlated with the product's guilt perception rating (correlation coefficient value > 0.2) except for item A15. Guilty perception has a very weak correlation with item A15 (I think this product is over-packaged) with correlation coefficients as 0.18 (< 0.2). Considering the packaging of the four tested products, this result could be explained as over-packaging is not a concern for the tested four products. Besides, consistent with reliability analysis results, the guilty perception has a negative relationship with price.

Assessment of items' correlation with the guilt perception rating score provided a source of validation evidence, as the items were intended to be developed highly correlated to the product's guilt perception rating. However, by checking the correlation between the items, item A9 might be removed for the future to avoid confusion to consumers and redundancy. Even though, it provided valuable information showing how consumers with different guilt tendencies may react differently to the ingredient in the product. The mean and standard deviation values of item A9 were very close to item A8 in Table 4.6. Moreover, it was highly correlated with item A8 (0.69) and A10 (0.68).

Validation of Food Product Guilt Scale

In this section, a Food Product Guilt Scale for measuring product characteristics affecting product guilt perception was attempted to be developed, and its construct validity was investigated in terms of reliability, discriminating capability, and correlation with rating on product's guilt perception. The scale was constructed with intrinsic and extrinsic product characteristics iden-

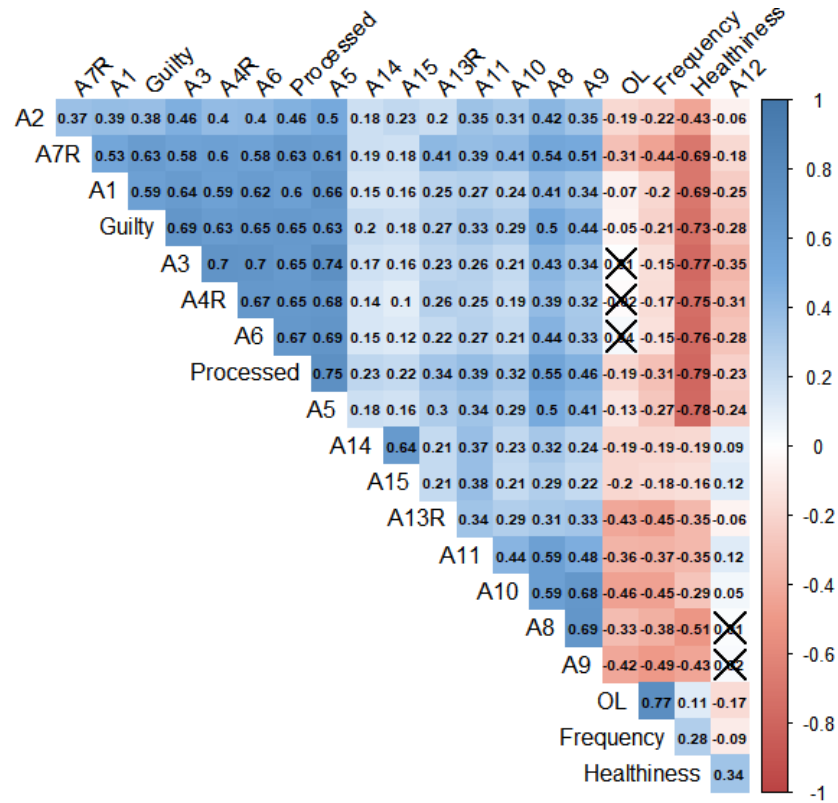


Figure 4.3: Correlation matrix between basic general questions and the Product related guilt scale items: Study B

tified from prior focus groups. The FPGS was found to be a reliable measurement instrument (including 14 items, with Cronbach's alpha, equaled to 0.87 after removing item A9) and had been cross-validated with two different samples of consumers. One of the items, A12, was found to have a low corrected item-total correlation of negative 0.13; it was understandable as price might not be a concern for the tested products. The Food Product Guilt Scale possessed discriminating and predictive validity, which could provide insight into development of guilt-free products. Items A9, A11, A12, and A13R could only discriminate the four products into two groups on average. However, only item A12 was found not discriminating after performing the test according to consumer segmenting among different guilt tendencies. The same explanation that price was not a concern for the tested product applied here as well. When evaluating the correlation of the items with rating on the product's guilt perception, only item A15 was found to have a low correlation. This can be explained by the consumers not considering over-packaging as a problem on the tested products. As discussed in the prior section, in developing

this Food Product Guilt Scale, one of the challenges was that more sources of variance existed, including consumers' different guilt tendencies and diversified features possessed by the tested products. Therefore, it is suggested to keep the scale open, and that category-specific scales may need to be further explored.

4.6.3 Relationship between guilt rating and other ratings

The correlation matrix (Figure 4.3) also presented the relationship between product guilt perception rating and other ratings.

The results strengthened the insights from Study A, and it showed that a significant positive correlation was found between guilt with the product's Processed perception ($r=0.65$). On the contrary, a significantly negative correlation was found between guilt with the product's Healthiness perception ($r=-0.73$). Potential eating frequency ($r=-0.21$) and perceived liking score ($r=-0.05$) were found to have weak relationships with the product's guilt perceptions. Overall, this study suggested that no clear evidence was found showing that the product's guilt perception has any correlation with consumers' perceived liking on the product. However, the low relationship between potential eating frequency and product's guilt perception could be explained by the different eating behaviors consumers may bear due to their distinct guilt tendency, as found in Chapter 3.

4.6.4 Emotional construct highly correlated with guilt rating

Emotional terms positively and negatively related to guilt perception were identified from the correlation analysis. Terms positively ($r > 0.2$) related to guilt included Regretful, Irresponsible, Lazy, Unproductive, Bloated, Heavy, Gross, Terrible. In contrast, negatively ($r < -0.2$) related terms included Healthy, Natural, Good, Balanced, Energized, Refreshed, Energetic, Productive, Sustained. Terms of Interested, Pleasure, Comfortable and Relaxed were found to have a very weak correlation with rating on the guilty, consistent with the result found from Study A.

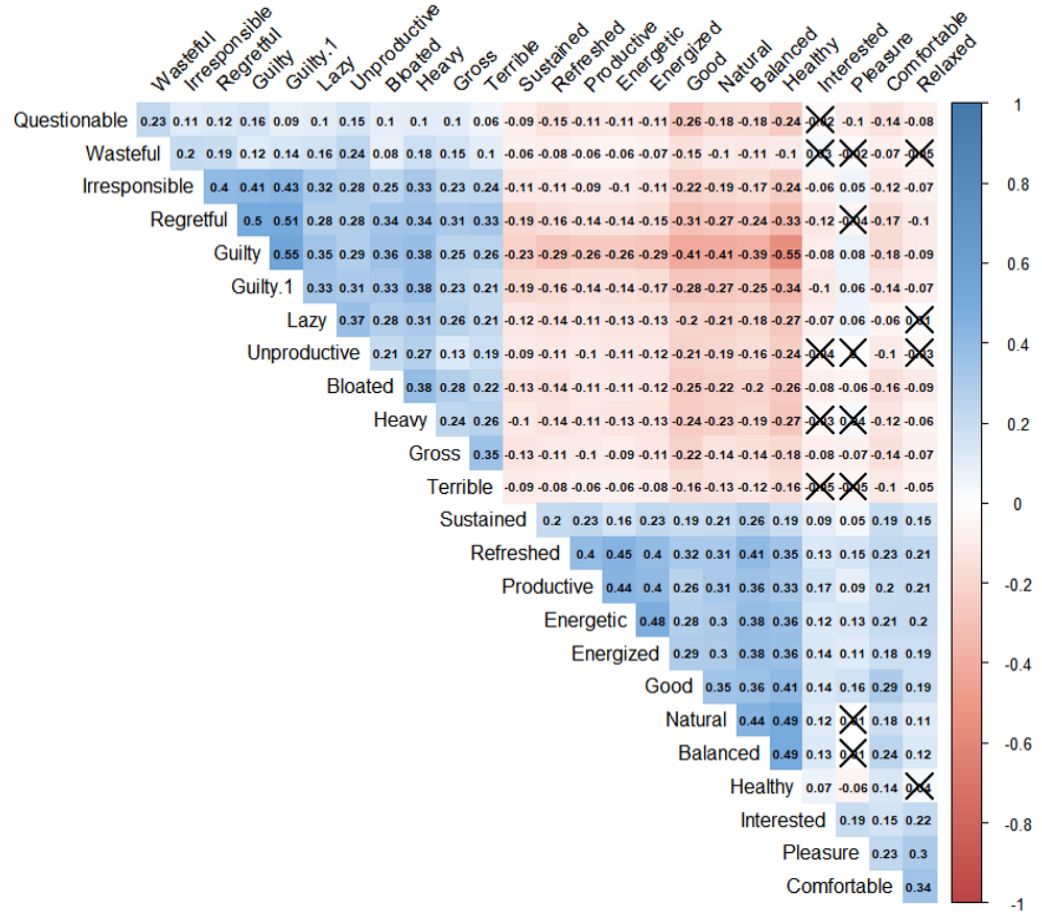


Figure 4.4: Correlation matrix between Guilty rating and the emotion terms: Study B

Emotion construct of guilt

CA factor map graphically represented the product space based on how they were differentiated in terms of emotions perceived by consumers through their product photo as well as the claims. The extraction of the first two dimensions (with a total of 93.5% of total inertia explained) was shown in Figure 4.5. The first dimension (88% of inertia) opposed emotional terms positively and negatively correlated to guilt. The emotional terms that have been significantly used to describe the positive side of the first dimension were Irresponsible, Guilty, Heavy, Lazy, Regretful, Unproductive and Terrible, while negative side of the first dimension were Productive, Energetic, Energized, Healthy, Balanced, Refreshed, Natural and Sustained. Similarly, the products that were related to the positive side of the first dimension is Lay's Clas-

sic Potato Chips, whereas the products associated with the negative side of the first dimension were organicgirl Baby Spinach and Delightful Garden Spinach Crisps. The correspondence between emotional terms and the products showed that Lay's Classic Potato chips described as Irresponsible, Guilty, Lazy, Terrible, Regretful, Heavy and Unproductive, whereas organicgirl Baby Spinach and Delightful Garden Spinach Crisps were described as Productive, Energetic, Energized, Refreshed, Balanced, Healthy, Good, Natural, Sustained, Comfortable, Relaxed, Interested and Questionable. While Quinn Pretzels Deli Rye Style was associated with the negative side of the 2nd dimension and was described as Questionable and Interested. As learned from the focus group discussion, many respondents could not recognize the first ingredient sorghum used in this product, which could explain why it was associated with Questionable.

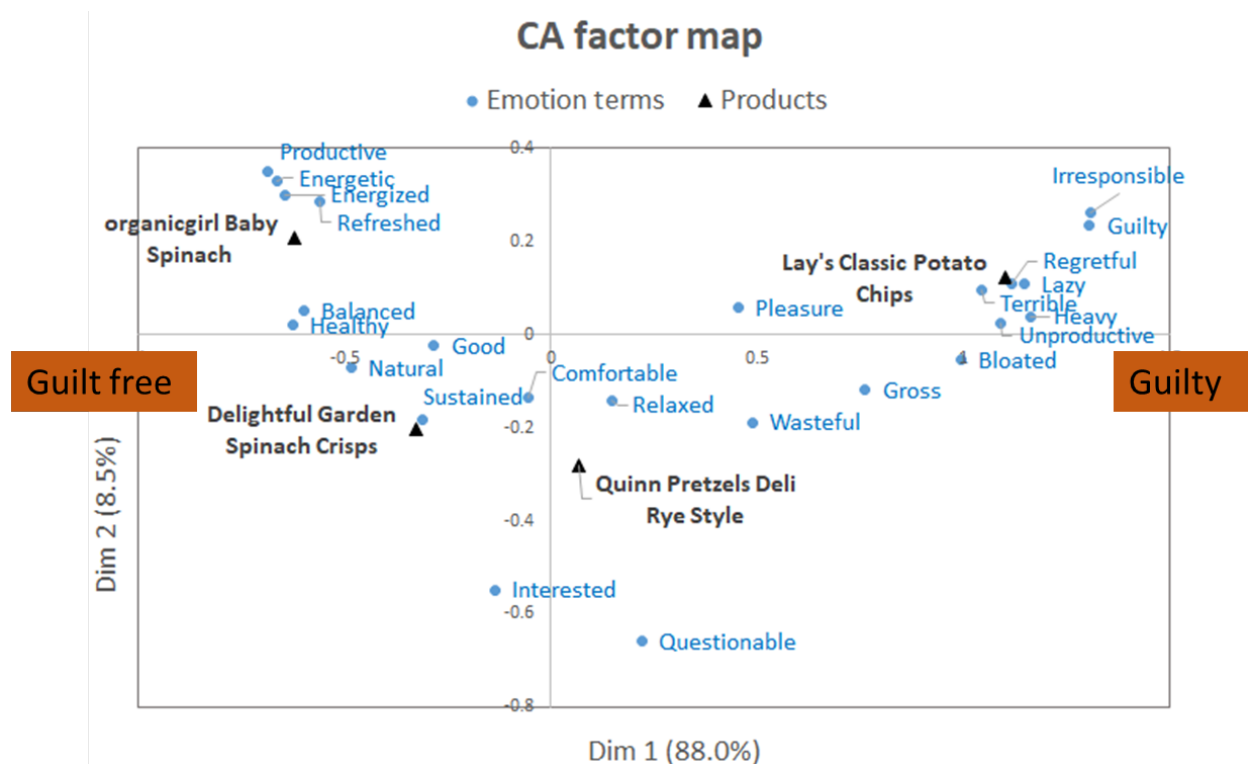


Figure 4.5: Representation of the products and the emotional terms from Correspondence Analysis (Dim 1 vs. 2): Study B

Product features association with consumers' guilt related emotions

MFA map of the first two dimensions visually presented how the products were differentiated in terms of emotions as well as among the product features (Figure 4.6). The first dimension opposed between product Lay's Classic Potato Chips in the positive side and organicgirl Baby Spinach in the negative side. Due to the fact that the first one was agreed as "high in sodium" (A5), "high in fat content" (A3), "taste good but not providing any nutritional benefits" (A6), "high in calorie" (A4R), "not very nutritious" (A1), and "could not eat a lot and still feel good" (A7R) and associated with emotional terms of guilty and regretful while the other product was perceived as "would be expensive" (A12) and characterized by emotional terms of Healthy, Natural, Balanced and Good. Moreover, the 2nd dimension contrasted between Lay's Classic Potato Chips in the positive side and two products Delightful Garden Spinach Crisps and Quinn Pretzels Deli Rye Style in the negative side. Lay's Classic Potato Chips was perceived as "high in fat content" (A3) and associated with emotional terms of Guilty, Regretful, Refreshed, Lazy, and Irresponsible. Whereas, the other two products were considered "would be expensive" (A12), "There are ingredients used I will not consume" (A10), "I would hesitate to eat the product due to its ingredients" (A9), "I would be concerned with the ingredients used in the product" (A8) and "The claims on the package raise concerns" (A11) and was described as Questionable.

The representation of the emotional terms and the product features showed how these two sets of data related to each other describing the tested products. Except that item A2 (high sugar content) was not discriminating in the first two dimensions, all the Nutritional values items (A1-6), together with item A7 (Food category), explained the most guilt and its related emotional terms in the positive side of the first dimension. On the other hand, all three ingredient-related items (A8-10) were highly associated with Questionable. Quinn Pretzels Deli Rye Style was associated with Questionable due to the ingredient of Sorghum. For product Delightful Garden Spinach Crisps, it was because consumers were concerned about what were the other 48% ingredients used in this product if it claimed was made with 52% fresh baby spinach.

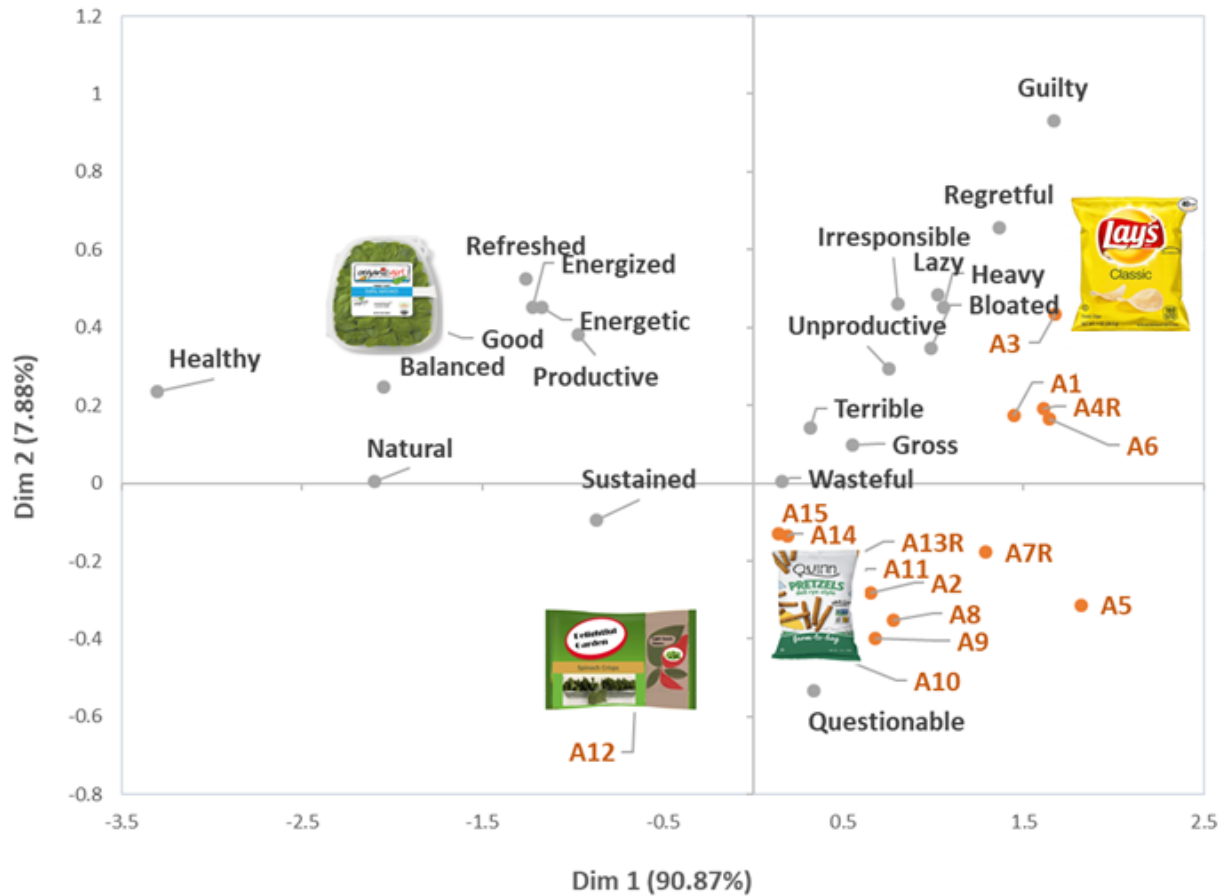


Figure 4.6: Product representation map from Multiple-factor Analysis (Dim 1 vs. 2): Study B

Note: Items A1 - A15 were listed on Table 4.6

4.6.5 Limitations

This study investigated how product features affect products' guilt perceptions based on visual information, showing product photos and claims describing the product, instead of inviting the consumers tasting the products. This design of the study made it impossible to investigate the effect of some product characteristics, for example, sensory properties, even though it has been shown from previous focus group discussions that different texture properties could elicit different guilt perception. Therefore, the attempt to develop a Food Product Guilt Scale in this study is just a first step; future studies need to continue validating the effect of other factors identified from the previous study. Another challenge in developing the scale was that the preliminary scale was generated based on qualitative studying on a wide variety of prod-

ucts. However, only limited products could be tested for validation in the following quantitative study. Consequently, some of the items in the scale might not be fairly tested due to the limitation brought by the test products. The currently developed scale could be further validated with a new set of products. In addition, the author suggested that it is better to keep the scale open as a product category-specific scale to be more useful in guiding product design. In that case, the approach used in developing the scale could be inspiring for future studies so to satisfy a lot of needs.

4.7 Conclusion

A Food Product Guilt Scale (FPGS) for measuring how product characteristics affect food product's guilt perception was developed, and its construct validity was investigated. The scale was constructed with items representative to the intrinsic and extrinsic food product characteristics. The FPGS was found to be a reliable measurement instrument with high internal consistency and was cross-validated with two different samples of consumers. It possessed discriminating and predictive validity, which provided a new angle in the design of healthy and sustainable snack products. All items tested from the scale positively related to guilt rating, except for item A12 (price), which could be due to the effect of tested product Lay's potato chips, which was rated highest guilty but considered the cheapest across the samples. Only four items (A9, A11, A12, A13R) could not discriminate more than two products, indicating that on average, guilty perception has a very weak correlation with tested products' characteristics of packaging, name and claim. However, consumers segmenting analysis showed that only item A12 was not discriminating. Ingredients mattered a lot to high guilt tendency cluster (Cluster 3), but not necessarily to other clusters or on average based on the result of item A9. Low guilt tendency cluster (Cluster 1) had less concern with packaging for the products they were familiar with (potato chips) compared to the other clusters or consumers on average, according to the result of item A11. Lay's Classic Potato chips made high guilt tendency consumers feel worse than low guilt tendency consumers, based on the result for item A13R.

Correlation analysis results indicated no clear relationship between ratings on guilty per-

ception and perceived liking. Emotional terms both positively and negatively related to guilt perception were identified. Emotional terms positively related to guilt were Regretful, Irresponsible, Lazy, Unproductive, Bloated, Heavy, Gross, and Terrible. Whereas, Healthy, Natural, Good, Balanced, Energized, Refreshed, Energetic, Productive, and Sustained were negatively related to guilt. Product representation from Multiple Factor Analysis showed that intrinsic product characteristics of nutritional values were the main contributors to tested products' guilt perception.

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Appendix A

Screeners for the Focus Group Discussion

1. What is your gender? [No ratio criteria for gender]

- 1. Male
- 2. Female

2. Please indicate your age?

- 1. Under 18 years old **Terminate**
- 2. 18 to 24 years old
- 3. 25 to 34 years old
- 4. 35 to 44 years old
- 5. 45 to 54 years old
- 6. 55 to 64 years old **Terminate**
- 4. 65 or older **Terminate**

3. What level of education have you completed?

- 1. Below high school **Terminate**
- 2. High School **Terminate**
- 3. Some College **Terminate**

4. College degree
 5. Master degree
 6. Doctorate degree
4. Which of the following description best describe your current job? [All are acceptable. No more than two respondents in one job type]
1. Accountancy, banking and finance
 2. Business, consulting and management
 3. Art and design
 4. Engineering and manufacturing
 5. Hospitality, Health care
 6. Information technology, Internet
 7. Public services and administration
 8. Science, education
 9. Transportation and logistic
 10. Research Assistant, Post doc
 11. Others [Please specify your current job below]
5. Which of the following statements best describe your lifestyle? [All items are acceptable]
1. Active
 2. Simple
 3. Always seek for tasty food
 4. Health and well-being
 5. Trendy
 6. Natural
 7. Fast-paced

- 8. Adventurous
 - 9. None of above
6. Which of the following statements describe well your diet preference? Please check all that apply. [All are acceptable]
- 1. Vegetarian
 - 2. Vegan
 - 3. Gluten Free
 - 4. Paleo Friendly
 - 5. Keto Friendly
 - 6. Sugar Conscious
 - 7. Dairy Free
 - 8. Kosher
 - 9. Organic
 - 10. Low Sodium
 - 11. Low Fat
 - 12. None of above
7. You indicated your diet preference in the last question, please describe briefly how it impacts your shopping habit in purchasing food and beverages.
8. Based on your responses, you are eligible to participate in a 90-minute focus group discussion sharing food choice opinion and behavior. Each participant will be required to complete a homework assignment that they bring with them to the session. You will receive a \$40 cash incentive for your participation. Would you be willing to complete the homework assignment and participate in a focus group?
- 1. Yes
 - 2. No **Terminate**

9. Which of the following times are you available to participate - DURING A REGULAR WEEK-DAY? (choose all that apply)

1. 12:00 - 1:30 pm

2. 3:00 - 4:30 pm

3. 4:00 - 5:30 pm

4. 5:00 - 6:30 pm

10. Thank you for your time and interest in our study. Please provide some personal contact information below. In order to determine if you qualify for this study, a staff member at the Center for Sensory Analysis and Consumer Behavior would need to ask you a few more questions over the phone.

If you are chosen to participate, you will receive a confirmation email after the phone call. If you do not receive an email inviting you to participate, you will not be scheduled successfully. But we look forward to working with you in the future!

Thank you very much! Please provide us some personal information so we can contact you.

1. What's your name?

2. What's your preferred email address?

3. What's your preferred contact phone number?

* Communication text when screener was terminated: Thank you for your time. Unfortunately, you did not qualify for the Food Choice Survey. We look forward to your participation in future studies.

Appendix B

Collage Homework Instruction

Think about food and beverages, which products makes you feel GUILTY when you have purchased, prepared or used them. Which products makes you feel LESS GUILT? On the opposite, which products could make you feel NO GUILT or make you feel GOOD. Prepare a collage with pictures taken from internet printouts, magazines, newspapers, drawings, sketches, etc. to illustrate the above question.

Please follow these guidelines to prepare this collage. PLEASE READ THIS CAREFULLY.

1. Grab four standard pieces of paper (A4, 8.27*11.69 inches paper) and tape them together (sample below). This will be your worksheet You may use a different material for your worksheet (cardboard, pasteboard, etc.). However, the dimensions of the final worksheet should be comparable. Slightly larger worksheets are acceptable.

2. To prepare the collage: In your new worksheet, glue or tape pictures printed out from the internet, cut outs from magazines, newspapers or any printed media. Drawings/sketching or a combination with pictures is also acceptable.

3. These pictures should represent the products and your emotions, feelings, or the state of mind you experience when you are purchasing, preparing, eating or using them. Be creative, the pictures could be anything! a. Minimum of 9 pictures b. Maximum of 18 pictures

4. How you organize the pictures in the worksheet is up to you, you can scatter them across the paper, or you can organize them by categories, or anything you see fit.

5. Please also use single words to describe the product characteristics make you feel that way or explain your feelings. Full statements are not acceptable.

Please bring the hard copy of your homework with you the day of the group! Pictures on your phone do not qualify! This will be checked at the door before entering the room. Only participants who bring their homework will be allowed into the session.

Appendix C

Focus Group Discussion Guide

1. INTRO debrief statement, 5min

2. Rapport, 5min

To begin, I would like to know a little more about you. Please tell me:

- First name
- Introduce one of your favorite foods you eat very often
- Introduce one of your favorite foods you eat only occasionally

3. Homework Review, 30min

Please share out which products makes you feel guilt if you've purchased, bought, ate or used them. What is the reason make you feel that way.

- Probe on when, where and why.
- Probe on how they would like to describe their feelings.
- Whether others agree or not?
- Any group of food or categories that everybody sorts of agree on?

Please share out which products make you feel sort of guilty if you've purchased, bought, ate, or used them. What is the reason make you feel that way.

- Same probing as above

Please share out which products or product categories makes you feel good or guilt-free if you've purchased, bought, ate or used them. What is the reason you feel that way.

- Same probing as above
- What about indulgent?

4. Products grouping activities, 40min

Individual Task, 10min:

Overall Instruction:

Next we would like to do an individual mapping task on the products we prepared for you. You will need to group the product on the white paper in front of you, based on the different level of guilt perception you may have with them. For this task, there are no right or wrong answers, and we are interested in your spontaneous mapping of the products.

Now, I am passing you the product cards, which include the product photo and descriptions about the products. Each of you will have 18 cards to work on, please go through them carefully.

More mapping instruction:

Place the cards on the paper according to the strategy that two products placed closer to each other are more alike in delivering the guilt perception than two placed further apart.

- Please use the blue tape to stick the card on the worksheet.
- Please use the whole space of the worksheet.
- The criteria for how to separate the samples just have to make sense to you.
- Please highlight the words or any part of the product photo on the cards, which drive you make that decision.
- Again there are no right or wrong solutions. Do you have any questions?

When you are done with your mapping task, please write down a few words describing your feelings or emotions.

Probing after the task, 30min:

Any volunteers would like to get started introducing us how you made decision on grouping the products, not what you have made. As I could easily check that later.

- What makes you feel that way? Any impact from their value set, life style, or demographic background?
- Any other ways you could describe your feelings?
- Any emotional terms related?
- Any relationship with pleasure?
- Could “Good for you”, “Better for you”, “Guilt free pleasure” fit into the idea?

5. Wrapping up, 10min

Appendix D

Screeners for the Online Surveys

1. What is your gender?

- Male
- Female

2. Please indicate your age?

- Under 18 years old **Terminate***
- 18 to 24 years old
- 25 to 34 years old
- 35 to 44 years old
- 45 to 54 years old
- 55 to 64 years old
- 65 to 74 years old
- 75 or older **Terminate**

3. What level of education have you completed?

- Below high school **Terminate**
- High School **Terminate**

- Some College but no degree
- College degree
- Master degree
- Doctorate degree
- Professional degree (JD, MD)
- Technical school

4. Please indicate the answer that includes your entire household annual income before taxes:

- \$0 - \$19,999
- \$20,000 - \$39,999
- \$40,000 - \$59,999
- \$60,000 - \$79,999
- \$80,000 - \$99,999
- \$100,000 - \$149,999
- \$150,000 or more

5. How many adults live in your household including yourself?

- 1
- 2
- 3
- 4
- 5 or more

6. How many children under the age of 18 are in your household?

- 0

- 1
- 2
- 3
- 4 or more

7. In the last 30 days, I have purchased the following products at a grocery store or super-market

- Fresh fruits and vegetables **Terminate if not selected**
- Snacks
- Clothing
- Swimwear **Terminate**

8. Based on your responses, you are eligible to participate a 10-15 minute online survey about food choice. There are no wrong answers, please feel free to answer as truthfully as possible. Upon full completion of this survey, you will be entered into a drawing to win \$100 cash. Five winners will be picked among the participants. Would you be willing to complete the survey?

- Yes
- No **Terminate**

9. A staff member from the Center for Sensory Analysis and Consumer Behavior will further contact with you on the drawing result. Please provide some personal contact information below for connection:

- What is your name?
- What is your preferred email address?
- What is your preferred contact phone number?

* Communication text when screener was terminated: Thank you for your time. Unfortunately, you did not qualify for the Food Choice Survey. We look forward to your participation in future studies.

Appendix E

Preliminary Food Consumer Guilt

Questionnaire tested in Study A

[INTRO]

Thank you for agreeing to complete this survey. The survey that you are going to take is about Food choice.

It includes two sections, which will take you about 10min to finish.

[Phase I: Non-product related questionnaire]

In this section, considering your normal food choice or eating behavior, how much do you agree or disagree with the below statements using a 7-point scale (Strongly disagree =1, Strongly agree =7).

[Before eating or drinking]

- Eating sugary products from a co-workers desk in the office makes me feel bad. [Availability]
- Ordering out instead of cooking a meal feels like a bad decision when there are ingredients available in the fridge. [Preparation & Cleaning]

- Choosing foods that are inexpensive and easy for meal preparation makes me feel good.*
[Preparation & Cleaning]
- Homemade food makes me feel better because I control what is in it. [Homemade]
- Homemade food makes me feel better because I can control the amount of each ingredient added to it. [Homemade]

[Eating or drinking]

- I feel bad for eating something that just tastes good but is not very healthy.[Craving for good taste]
- I feel bad for craving “treats” in the evening. [Craving/desire in evening]
- It is a pleasure to eat ice cream, even to excess. * [How much/how often]
- I feel bad when I eat too many snacks, so I don’t buy them very often. [How much/how often]
- I feel good having soda with pizza, but not with salad.[Food pairing]
- I feel bad when I eat fast/convenient food outside the home or while traveling.[Eating outside]
- When I do not work out, anything I eat makes me feel bad. [After eating]
- Eating snacks close to dinner time is not an issue to me. * [Eating occasions]

[Using/Packaging]

- When I snack, I feel better eating from a pre-portioned snack than from a larger package.
[Proportioned packaging]
- I feel bad when I buy food and it spoils before I have a chance to use it. [Food go bad before using]

- I am skeptical of pre-packaged foods with really long shelf lives. [Long shelf life]
- I prefer to buy products that are recyclable (over those that are not). [Single use regular plastic]
- I would feel bad buying shrink wrapped sweet potatoes due to unnecessary packaging. [Unnecessary packaging]

[Social/Community]

- I feel good for buying from local food stores. [Support local community & small business]
- When talking to my friends about food, I feel bad about unhealthy food choices.[Social pressure]
- My friends' food choices influence my eating behavior. [Social pressure]
- I spread my calories throughout my day so I can enjoy multiple types of foods and/or drinks. [Balance calories]
- The fact that a product is plant-based or animal-based is not a concern to me.* [Need state]

[* Coding to be reversed for calculating the score of base guilt level.]

Appendix F

Updated Food Consumer Guilt Questionnaire tested in Study B

[INTRO]

Thank you for agreeing to complete this survey. The survey that you are going to take is about Food choice.

[Non-product related questions]

In this section, considering your normal food choice or eating behavior, how much do you agree or disagree with each of the statements.

Click the Next button below, to start test in this section.

1. Eating sugary products from a co-workers desk in the office makes me feel bad.
2. Ordering out instead of cooking a meal feels like a bad decision when there are ingredients available in the fridge.
3. Homemade food makes me feel better because I control what is in it.
4. I feel bad for eating something that just tastes good but is not very healthy.
5. I feel bad for craving “treats” in the evening.

6. I feel bad when I eat too many snacks, so I don't buy them very often.
7. I feel good having soda with pizza, but not with salad.[Food pairing]
8. I feel bad when I eat fast/convenient food outside the home or while traveling.
9. When I do not work out, anything I eat makes me feel bad.
10. I feel bad eating snacks close to dinner time.
11. When I snack, I feel better eating from a pre-portioned snack than from a larger package.
12. I feel bad when food spoils before I have a chance to use it.
13. I am skeptical of pre-packaged foods with really long shelf lives.
14. I prefer to buy products that are recyclable (over those that are not).
15. I would feel bad buying shrink wrapped sweet potatoes due to unnecessary packaging.
16. I feel good for buying from local food stores.
17. When talking to my friends about food, I feel bad about unhealthy food choices.
18. I don't think much about food each day.*
19. Cooking or barbequing is not much fun.*
20. Talking about what I ate or am going to eat is something I like to do.
21. Compared with other daily decisions, my food choices are not very important.*
22. When I travel, one of the things I anticipate most is eating the food there.
23. I do most or all of the clean-up after eating.
24. I enjoy cooking for others and myself.
25. When I eat out, I don't think or talk much about how the food tastes.*

- 26. I do not like to mix or chop food.*
- 27. I do most or all of my own food shopping.
- 28. I do not wash dishes or clean the table.*
- 29. I care whether or not a table is nicely set.

[* indicated scores to be reversed]

[Product-related questions]

In the next section, you will be asked questions about 4 products. Click the Next button below, to start this section.

Please read the picture of product and its claims on the screen. Then click the Next button to answer questions based on how you would feel about the product.

- 1. How much do you like or dislike this product? (Dislike Very Much = 1, Like Very Much = 7)
- 2. How often would you eat this product? (Never = 1, Frequently = 7)
- 3. How guilty would you feel consuming this product? (Not Guilty At All = 1, Very Guilty = 7)
- 4. How processed would you expect this product to be? (Not Processed At All = 1, Highly Processed= 7)
- 5. How healthy would you expect this product to be? (Very Unhealthy = 1, Very Healthy = 7)

Appendix G

Preliminary Food Product Guilt Questionnaire tested in Study A

[Phase I: Basic general questions related to products]

Please read the description next to the product, then answer the questions on how you feel about the product.

- How much do you like or dislike this product? (Dislike Very Much = 1, Like Very Much = 7)
- How likely would you be to try this product? (Very Unlikely = 1, Very Likely = 7)
- How often would you buy this product? (Never = 1, Frequently = 7)
- How often would you eat this product? (Never = 1, Frequently = 7)
- If served, how much of this product would you typically eat at one time? (Much Less Than 1 Serving = 1, Much More Than 1 Serving = 7)
- How guilty would you feel consuming this product? (Not Guilty At All = 1, Very Guilty = 7)
- How processed would you expect this product to be? (Not Processed At All = 1, Highly Processed = 7)

- How healthy would you expect this product to be? (Very Unhealthy = 1, Very Healthy = 7)

[Phase II: Test how each sample stimuli could affect guilt, all statements were randomized]

Please indicate how much you agree or disagree with each of the statements using a 7-point scale (Strongly disagree =1, Strongly agree =7).

[Nutritional values]

- I associate this product as not being very nutritious.
- I associate this product as having a high sugar content.
- I associate this product as having a high fat content.
- I associate this product as having a low calorie content. *
- I associate this product as having a high sodium content.
- I associate this product with tasting good, but not providing any nutritional benefit.

[Food categories & Eating or drinking]

- I could eat a lot of this product, and still feel good. *

[Ingredients]

- I would be concerned with the ingredients used in this product.
- I would hesitate to eat this product due to its ingredients.
- There are ingredients used in this product I will not consume.

[Claims]

- The claims on the package raise concerns.

[Price]

- I would eat this less frequently because I think it would be expensive.

[Name]

- The name of this product makes me feel good.*

[Using/Packaging]

- I feel good about the packaging used for this product. *
- I am not sure if this product is over-packaged.

Phase III: Identify the emotional construct correlated to guilt in respect of food. All items were randomized.

How do you think you would feel if you CONSUMED this product? Select all that apply (Figure.G.1).

☐	Balanced	☐	Gross	☐	Questionable
☐	Bloated	☐	Guilty	☐	Refreshed
☐	Bossy	☐	Healthy	☐	Regretful
☐	Comfortable	☐	Heavy	☐	Relaxed
☐	Confused	☐	Interested	☐	Rewarded
☐	Doubtful	☐	Irresponsible	☐	Sustained
☐	Energetic	☐	Lazy	☐	Terrible
☐	Energized	☐	Natural	☐	Tricked
☐	Fun	☐	Pleasure	☐	Unproductive
☐	Good	☐	Productive	☐	Wasteful

Figure G.1: CATA items: Study A

Appendix H

Updated Food Product Guilt Questionnaire tested in Study B

[Phase I: Basic general questions related to products]

In this last section, you will be asked questions about 4 products. Click the Next button below, to start this section.

Please read the picture of product and its claims on the screen. Then click the Next button to answer questions based on how you would feel about the product.

1. How much do you like or dislike this product? (Dislike Very Much = 1, Like Very Much = 7)
2. How often would you eat this product? (Never = 1, Frequently = 7)
3. How guilty would you feel consuming this product? (Not Guilty At All = 1, Very Guilty = 7)
4. How processed would you expect this product to be? (Not Processed At All = 1, Highly Processed= 7)
5. How healthy would you expect this product to be? (Very Unhealthy = 1, Very Healthy = 7)

[Phase II: Test how each sample stimuli could affect guilt, all statements were randomized]

Please indicate how much you agree or disagree with each of the statements using a 7-point scale (Strongly disagree =1, Strongly agree =7).

1. I associate this product as not being very nutritious.
2. I associate this product as having a high sugar content.
3. I associate this product as having a high fat content.
4. I associate this product as having a low calorie content.*
5. I associate this product as having a high sodium content.
6. I associate this product with tasting good, but not providing any nutritional benefit.
7. I could eat a lot of this product, and still feel good. *
8. I would be concerned with the ingredients used in this product.
9. I would hesitate to eat this product due to its ingredients.
10. There are ingredients used in this product I will not consume.
11. The claims on the package raise concerns.
12. I think this product would be expensive.
13. The name of this product makes me feel good.*
14. I feel bad about the packaging used for this product.
15. I think this product as over-packaged.

[* indicated scores to be reversed]

Phase III: Identify the emotional construct correlated to guilt in respect of food. All items were randomized.

How do you think you would feel if you CONSUMED this product? Select all that apply (Figure.G.1).

☐	Balanced	☐	Healthy	☐	Questionable
☐	Bloated	☐	Heavy	☐	Refreshed
☐	Comfortable	☐	Interested	☐	Regretful
☐	Energetic	☐	Irresponsible	☐	Relaxed
☐	Energized	☐	Lazy	☐	Sustained
☐	Good	☐	Natural	☐	Terrible
☐	Gross	☐	Pleasure	☐	Unproductive
☐	Guilty	☐	Productive	☐	Wasteful

Figure H.1: Updated CATA items: Study B

Appendix I

R scripts

R scripts in Chapter 2:

```
#calling data
```

```
Guilt=read.csv(file = "FAST4.csv", head=TRUE, sep=",",dec=".")
```

```
sorting=Guilt[,-1]
```

```
# product space from MCA
```

```
res.fast=fast(sorting, sep.words=";")
```

```
# extracting eigenvalues and co-occurrence table
```

```
res.fast$cooccur
```

```
res.fast$eig
```

```
# textural data
```

```
cont.table1=read.csv(file = "corconti.csv", head=TRUE, sep=",",dec=".")
```

```
cont=cont.table1[,-1]
```

```
## remove the outliers, words that have been used at least five times
```

```
apply(cont,MARGIN=2,FUN=sum)
```

```
words_selection5=cont[, apply(cont,2,sum)>=5]
```

```

# product space from CA
res.ca=CA(words_selection5)

# extract eigenvalues
res.ca$eig

R scripts in Chapter 3:

# calling data for study 3A
datr=read.csv(file="NonpqR2.csv",head=TRUE)
datr1=datr[,-1]
alpha(datr1)

# total scale scores calculation
rs=apply(datr1,1,sum)

# total scale scores distribution
hist(rs, breaks=12,xlim=range(rs), ylab='Frequency',
xlab='Total_Score_Scale', main='Distribution_of_Total_score_scale')

# skewness checking
skewness(rs)

# normal QQ plot
qqnorm(rs)

# Normality test
shapiro.test(rs)

# calling data for study 3B
datr=read.csv(file="FGS.csv",head=TRUE)
datr1=datr[,-c(1:2,19:22)]
alpha(datr1)

# total scale scores & its distribution
rs=apply(datr1,1,sum)

hist(rs, breaks=12,xlim=c(20,120), ylim= c(0,60), ylab='Frequency',

```

```

xlab='Total_Score_Scale', main='Distribution_of_Total_score_scale')

# skewness
skewness(rs)

# normal QQ plot
qqnorm(rs)

# Normality test
shapiro.test(rs)

# calling data for factor analysis
datr=read.csv(file="FCGS.csv",head=TRUE)

# factor analysis
f3om <- fa(datr[,3:18],nfactors = 3,rotate = "oblimin",fm="minres")
print(f3om)

fa.diagram(f3om, main="Factor_Analysis", digits=2,cex=1.1)
fa.diagram(f3om,nord.font.cex=1)

R scripts in Chapter 4:

# calling data for study 4A
datr=read.csv(file="Pqr1.csv",head=TRUE)

# correlation analysis between ratings and items
cor1=rcorr(as.matrix(datr[,7:29]))

cor1

col <- colorRampPalette(c("#BB4444", "#EE9988", "#FFFFFF", "#77AADD", "#4477AA"))
corrplot(cor1$r, method="color", col=col(200),
type="upper", number.cex=0.6,
addCoef.col = "black",
tl.col="black", tl.srt=45,
p.mat = cor1$P, sig.level = 0.05,
diag=FALSE

```

```

)

# correlation analysis between guilt rating and emotions
cor2=rcorr(as.matrix(datr[,c(12,30:59)]))
cor2
corrplot(cor2$r, method="color", col=col(200),
type="upper", number.cex=0.6,
addCoef.col = "black",
tl.col="black", tl.srt=45,
p.mat = cor2$P, sig.level = 0.05,
diag=FALSE
)

# calling data for study 4B
datr=read.csv(file="PqCR.csv",head=TRUE)
# reliability test for all 15 items
datr3PG=datr[,c(3,10:24)]
datr3all=datr3PG[,2:16]
alpha(datr3all)
# reliability test for 14 items
datr3all2=datr3PG[,c(2:9,11:16)]
alpha(datr3all2)

# correlation analysis between ratings and items
cor1=rcorr(as.matrix(datr1R[,4:23]))
col <- colorRampPalette(c("#BB4444", "#EE9988", "#FFFFFF", "#77AADD", "#4477AA"))
corrplot(cor1$r, method="color", col=col(200),
type="upper", order="hclust", number.cex=0.6,
addCoef.col = "black",

```

```

tl.col="black", tl.srt=45,
p.mat = cor1$P, sig.level = 0.05,
diag=FALSE
)

# correlation analysis between guilt rating and emotions
cor2=rcorr(as.matrix(datr[,c(7,25:48)]))
cor2
corrplot(cor2$r, method="color", col=col(200),
type="upper", order="hclust", number.cex=0.6,
addCoef.col = "black",
tl.col="black", tl.srt=45,
p.mat = cor2$P, sig.level = 0.05,
diag=FALSE
)

# data for CA
Count=aggregate(datr2E[,4:27],by=list(datr2E$Sample_Name),sum)
# CA
Em.ca=CA(Count[,2:25])

# calling data for MFA
datr=read.csv(file="MFA.csv",head=TRUE)
datr1=datr[,c(1,7:41)]
my.melt1=melt(datr1,id.vars=1)
means1=acast(my.melt1,Prdt~variable, mean)
# MFA
guilt=MFA(means1,group=c(15,20),type=rep("c",2), ncp=2,
name.group = c("Product_characteristics","Emotions"), graph=TRUE)

```