



UNIVERSITI PUTRA MALAYSIA

***INVESTIGATING MALAYSIANS' PREFERRED MOUTH BEHAVIOUR
AND ITS RELATIONSHIP TO THEIR EATING BEHAVIOUR***

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ABSTRACT

Culture influences eating choices, attitudes, and behaviour. It alters their habits, taste, and preferences. Consumer behaviour requires understanding how cultural views, knowledge, and attitude impact food acceptance. Eating behaviour comprises what, when, and how much to eat. Understanding eating behaviour is crucial since our food choices affect both individuals and society. The objectives of the study were to understand the link between Malaysian Preferred Mouth Behaviour with their Eating Behaviour and the relationship between Eating behaviour with the BMI, age, gender, and ethnicity among Malaysian. Mouth behaviour (Individuals' particular technique of manipulating food in their mouths) and eight dimensions of eating behaviour (Hunger, Food Responsiveness, Emotional Over-eating, Food Enjoyment, Satiety Responsiveness, Emotional Under-eating, Slowness in eating) were determined from a questionnaire among Malaysian adults 18–65 years old. A total of 209 respondents with a variety of ethnicity were enrolled in this survey and categorized by their preferred oral processing behaviour. Body mass index (kg/m^2) for all the demographic information and eating behaviour was evaluated. Latent Class Clustering and ANOVA were carried out to analyze the data in order to determine the actual mouth behaviour and measure the means of all the parameters. A latent class analysis with four classes was performed on the scores of the first section in the questionnaire form in order to determine the four major diverse Mouth Behaviour types among consumers. The analysis of the dimensionality of the adaptable Adult Eating Behaviour Questionnaire (AEBQ) used by Partial Least Squares-Confirmatory Factor Analysis (PLS-CFA) to reveal the weight and correlations between the appetitive

traits. This perspective improves the insight into eating behaviour among Malaysian communities. Consumers' mouth behaviour ($F_{(15, 208)} = 2.941$; $p < .05$), BMI ($F_{(15, 208)} = 3.737$; $p < .05$), and age ($F_{(15, 208)} = 2.482$; $p < .05$) affected their consumption of Malaysian meals and their sensory perception. People in Malaysia chew, crunch, and smooch a lot. Underweight populations avoid food, whereas younger age groups consume more. No race-gender relationship was found. This study can be a baseline for any product development as it provides a suitable tool to measure and classify Malaysian individuals in the Preferred Mouth Behaviour framework. All the results and observation can be used as a foundation to build future oral processing studies.

ABSTRAK

Budaya mempengaruhi pilihan pemakanan, sikap dan tingkah laku. Ia mengubah tabiat, rasa, dan pilihan mereka. Tingkah laku pengguna memerlukan pemahaman bagaimana pandangan budaya, pengetahuan dan sikap mempengaruhi penerimaan makanan. Tingkah laku makan terdiri daripada apa, bila, dan berapa banyak yang perlu dimakan. Memahami tingkah laku makan adalah penting kerana pilihan makanan kita mempengaruhi kedua-dua individu dan masyarakat. Objektif kajian adalah untuk memahami hubungan antara Tingkah Laku Mulut Pilihan Malaysia dengan Tingkah Laku Makan mereka, hubungan antara tingkah laku Makan dengan BMI, umur, jantina, dan etnik di kalangan rakyat Malaysia, dan untuk menyediakan alat yang sesuai untuk mengukur dan mengklasifikasikan individu Malaysia dalam rangka kerja Gelagat Mulut Pilihan. Tingkah laku mulut (teknik tertentu individu memanipulasi makanan di dalam mulut mereka) dan lapan dimensi tingkah laku makan (Lapar, Responsif Makanan, Emosi Terlalu Makan, Keseronokan Makanan, Tindak Balas Kenyang, Kurang Makan Emosi, Lambat dalam makan) ditentukan daripada soal selidik dalam kalangan orang dewasa Malaysia berumur 18–65 tahun. Sejumlah 209 responden dengan pelbagai etnik telah didaftarkan dalam tinjauan ini dan dikategorikan mengikut tingkah laku pemrosesan lisan pilihan mereka. Indeks jisim badan (kg/m^2) untuk semua maklumat demografi dan tingkah laku makan telah dinilai. Pengelompokan Kelas Terpendam dan ANOVA telah dijalankan untuk menganalisis data untuk menentukan tingkah laku mulut sebenar dan mengukur cara semua parameter. Analisis kelas terpendam dengan empat kelas telah dilakukan pada markah bahagian pertama dalam borang soal selidik untuk menentukan

empat jenis Tingkah Laku Mulut yang pelbagai di kalangan pengguna. Analisis dimensi Soal Selidik Tingkah Laku Pemakanan Dewasa (AEBQ) yang boleh disesuaikan yang digunakan oleh Analisis Faktor Pengesahan Separa Kuasa Dua-Kurang Saham (PLS-CFA) untuk mendedahkan berat dan korelasi antara ciri selera. Perspektif ini menambah baik wawasan tentang tingkah laku makan dalam kalangan masyarakat Malaysia. Tingkah laku mulut pengguna ($F_{(15, 208)} = 2.941; p < .05$), BMI ($F_{(15, 208)} = 3.737; p < .05$), dan umur ($F_{(15, 208)} = 2.482; p < .05$) mempengaruhi pengambilan makanan Malaysia dan persepsi deria mereka. Orang di Malaysia banyak mengunyah, mengunyah, dan berlemak. Populasi kurang berat badan mengelakkan makanan, manakala kumpulan umur yang lebih muda mengambil lebih banyak. Tiada hubungan kaum-jantina ditemui. Segala keputusan dan pemerhatian boleh digunakan sebagai asas untuk membina kajian pemprosesan lisan pada masa hadapan.

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CHAPTER 1

INTRODUCTION

1.1 Background

Culture greatly influences individuals' food decisions and food-related attitudes and behaviour. It alters their tendencies, as well as their behaviour and taste perception. As a result, culture influences how individuals and cultural circles are portrayed. Consumers' cultural backgrounds shape how they see food, influencing how much they consume and accept it. Even in the case of very allergic individuals, the cultural milieu has a significant impact on their dietary attitudes. Texture preferences are affected by how the mouth moves, which was not known before. People move food between their tongue and the roof of their mouths with their mouths. People have different ways of moving food around in their mouths. This is called "mouth behaviour," and it affects the types of food textures they like. As a result, understanding how cultural individual perceptions, knowledge, and attitude affect food acceptability is crucial for understanding consumer behaviour. In addition, our ability to foresee and maximize client choices needs a detailed understanding of cultural aspects.

Eating behaviour is a broad concept that includes decisions about what to eat, when, and how much to consume. Understanding eating behaviour is critical because

our food choices affect individuals and communities. From birth until school age, human eating behaviour develops quickly. Normal growth should result in enough but not obesity and overweight during childhood, as well as good eating habits throughout life. We look at brain mechanisms, individual childhood development, parent-child interaction, and social impacts on eating behaviour. This review combines studies on the biological foundation of energy management, current understanding of sensory determinants, social impacts research, and eating behavioural processes that influence the process of food acceptance and appetite regulation.

Significant progress has been made in understanding how physiology, culture and traditional factors impact food selections separately, but how these elements mix to create eating behaviour is less clear. Because of the numerous factors that impact eating, each particular element will likely only reflect a small fraction of the diversity in eating behaviour. As a result, establishing interdisciplinary methods for studying the linkage between mouth preference and eating behaviour may give new insights into individuals' food selections and create a framework that helps clarify food decision-making.

1.2 . Problem Statement

Malaysian urban society's food and eating culture have changed in certain dimensions. Understanding the relationship between Malaysian preferred mouth behaviour and their eating behaviour is significant as recognizing consumers' choice of food product and acknowledging the impact of eating behaviour. Limited research on Malaysia is available since much research on food preferences and eating behaviour focuses on European and American countries. Therefore, this research examines the pattern of Malaysian cultural food preferences concerning their eating habits. The outcomes in this study can be used in future research in designing food products that are more suitable for the Malaysian population. This discovery also would be beneficial as a foundation or baseline structure for a developer, business, entrepreneur, engineer or even scientist to create a healthier, nutritious and compatible Malaysian food, especially in reducing obese amounts in this country

1.3 Objectives

The aim and the purpose of this study are:

1. To understand the link between Malaysian Preferred Mouth Behaviour with their Eating Behaviour.
2. To comprehend the relationship between Eating behaviour with the BMI, age, gender and ethnicity among Malaysian.



1.4 Scope of Study

This research study focuses on the linkage of Malaysian consumers' backgrounds based on their personal information, primarily on their actual sensory perception of foodstuffs and eating behaviour. The data will be examined from the questionnaire survey of the participants in preferred mouth behaviour and its relation with the eating behaviour on consumer reactions to foods. The additional demographics such as age, gender, BMI classifications, and ethnicity also will be evaluated to acknowledge the interrelation of their eating behaviour.

CHAPTER 2

LITERATURE REVIEW

2.1 Food Texture

Food texture has a significant impact on a consumer enjoys a food product (Foegeding et al., 2011). Texture or tactile is one of the criteria that customers use to assess the food quality. Humans utilise the sense of texture to feel the food in our mouth. It can be described as "hard," "soft," "liquid," "solid," "rough," "smooth," "creamy," "crispy," "lumpy," "gritty," and so on. Textural terms are closely connected to the density, viscosity, surface tension, and other physical properties of a food product (Pascua et al., 2013). This research clearly demonstrates the determining factors of experience and environment on food liking and food texture. This was also validated by Antmann et al. (2011), who discovered tiny variances between different Spanish-language-speaking countries (Spanish speakers in Spain versus those in Argentina and Uruguay) due to cultural and geographical environment differences. By analysing texture phrases across languages, Bourne (2002) discovered that Japanese culture creates the most complete texture terms, most likely due to the sensitivity of their cuisine culture.

Texture is one of the four essential quality characteristics in meals, along with appearance, taste, and nutrition (Bourne, 2002; Chen and Opara, 2013). Food texture,

according to Bourne, is "that collective of particular appearance resulting from the structural components of the meal, mainly detected through the sensory experience of direct contact, associated with the compression, breakdown, and flow of the food under a force, and objectively measured by functions of mass, time, and distance." Texture is an essential factor in consumer evaluations of food quality in general (Garca-Segovia et al., 2008).

Despite the fact that textural features are directly connected to physical and mechanical aspects of food, the mechanisms influencing food texture perception and enjoyment are frequently more complicated than what food physics can explain. Food texture perception is essentially the outcome of food–body interactions, which include both oral physiology and sensory psychology. As a result of this acknowledgment, scientific research in food physics, oral physiology, and sensory psychology has risen dramatically in recent years (Chen, 2009, 2014; Chen and Stokes, 2012; Lucas et al., 2002; van Vliet, 2002).

Food texture perception can be considered as a perceived assumption based on contact (visual, auditory, and tactile) with the food product. Quite an opinion is sometimes not easy to form. It is a complex process of information transfer, processing, and interpretation, rather than a direct representation of the meal's attributes. Food scientists are well aware of the differences in texture perception across individuals, as well as the mismatch between scientifically measurable texture and human felt texture, but completely comprehending the causes for these differences remains a difficulty. Individuals evaluated the texture of a food product differently, and this impression was influenced by Mouth Behavior. Food texture variation over time was critical to product approval.

2.2 Mouth Behaviour

Acceptance and rejection of food products were influenced by an individual's Mouth Behavior. According to Jeltema (2015), the Understanding & Insight Group (U&I) has discovered a previously unknown, unspoken need that influences texture preferences which is mouth activity. Individuals have a unique way of manipulating food into their mouths where we may have called it as mouth behaviour, which determines the food textures they select. As a result, texture is not the major purpose of like, but rather textures that correspond to a preferred or desired mouth behaviour.

Jeltema et al., 2015 developed the Graphic Mouth Behaviour Tool to categorize participants into four groups depending on their preferred method of manipulating food in the mouth which are Crunchers, Chewers, Smooshers, and Suckers. Crunchers tend to crunch and swallow food quickly, whereas Chewers chew for longer periods of time before swallowing and prefer chewy foods. Smooshers smooshed their food in their mouths, whilst Suckers preferred hard food that could be swallowed for a long time. Such variations in mouth behaviour may alter the structure of the food, resulting in varied oral sensory perception and so leading to individual disparities in mouthfeel perceptions.

The use of these four groups to understand textural preferences and the implications for Malaysians' eating behaviours. There is a clear link between chewing habits and meal liking and satisfaction. A novel model for understanding the drivers of texture preference is introduced here, as well as how to apply that model to optimize products. A portion of this material and data is also available in a book chapter by (Jeltema et al.,2014). Brown and Braxton were correct in their view that the ability to handle food in the mouth is a major driver of preference. The findings indicate that people have a preferred technique of manipulating food in their mouths (mouth

behaviour), and that this activity influences the food textures they prefer. As a result, it is textures that fit with the preferred mouth action that are the major drivers of like. Furthermore, these findings show that persons can be classified into four mouth behaviour groups, which we have labelled which are chewers, crunchers, suckers and smooshers.

Several participants were separated into two mouth action categories. Crunchers and Chewers were type one individuals that preferred to break meals with their teeth. Crunchers bit with massive strength and liked foods that broke up (fractured) while eating. Chewers favoured foods that could be eaten for a longer amount of time and did not shatter on biting. Suckers and Smooshers, type two, enjoyed moving food between the tongue and the roof of the mouth. They largely differed in the abrasiveness of the foods they chose. Suckers favoured tougher foods that could be sucked on for a long time (such as hard candies and objects that could be held in their mouths). Soft meals, such as creamy sweets like puddings that did not require much mouth activity but spread throughout the mouth and could be retained in the mouth for an extended period of time, were preferred by smooshers.

Individuals can be categorised based on how they process food, according to oral process study (Engelen & de Wijk, 2012). It is necessary to explore the interaction among oral processing categories and these mouth behaviour groups. In the future, quantitative measurement of oral digestion will need to be connected to these mouth behaviour groupings. Mouth and jaw size and shape, saliva flow or saliva enzymes, oral health, and mechanical and durability or rheological properties of the foodstuffs should all be taken into account.

Simultaneously, in terms of physics parameters there is an increasing number of studies being done on the oral mechanisms during mastication in order to truly

comprehend their implications on sensory perception. Food manipulation and mastication differences have been shown to alter sensory perception. The study showed a number of interesting findings, including the fact that chewing activity varies from person to person yet is stable within an individual (Lassauzay et al. 2000; Po et al. 2011). Brown and Braxton (2000) classified factors into four groups depending on their ability to shred of nuts and chewing gum. The above study also indicated how people possess varied ways for oral digestion of food, therefore various groups would perceive the samples differently at any given stage. According to Brown and Baxton, individual variations in the capacity to handle and manage the product in the mouth might have been a primary driver of liking and personal preferences. However, the only link discovered in their study was one linking biting force and liking.

Individual differences in eating preferences were identified by Engelen and van Doorn in 2012. In their research of semisolid foods (custard and mayonnaise), they ask respondents to describe or illustrate what they performed with the foodstuff in their mouths. Based on these self-descriptions, they developed four styles: simple, taster, manipulator, and tonguer. Individuals used their tongue, palate, and teeth in different ways. De Wijk et al. (2003) concluded that when participants processed a particular product in their preferred way, they acquired the best sensory experience, providing validity to the likely relationship between chewing action and preference. More study has showed that the interpretation of characteristics altered throughout mastication and was associated with certain oral motions, showing that humans use mouth movements to improve specific sensations (de Wijk et al. 2006, 2008).

Consumers use an oral digestion method which is matched in context of effectiveness and sensation, according to Engelen and van Doorn (2012) and the process manner is also dependent upon that meal (especially the perceived tranquilly

of the meal). As a result, this study suggests that people may adopt the chewing habit that effectively provides the flavours and strength of flavour that they desire (various ways of eating meals is likely to vary the strength of the flavour more than the flavour itself). Furthermore, personality has been shown to impact chewing behaviour (Rey et al. 2007). This implies that chewing behaviour may be inherited. These variations in product preference and textural perception have great consequences for how individuals perceive food, which in turn affect how much they will consume and accept the meal, hence influencing their eating behaviour.



2.3 Eating Behaviour

Observations of human's eating behaviour suggest that the introduction of different food textures may have a significant impact on their texture preferences in later years, as well as on oral physiological processes. Eating behaviour is influenced by a complex interaction of physiologic, psychological, social, and genetic variables that impact meal schedule, food amount, food choice, and food selection. The eating behaviour of an individual is impacted by both internal and external factors, such as food availability, knowledge, attitudes, emotional state, and past experiences.

The Adult Eating Behaviour Questionnaire (AEBQ) is a maturity level extension of a widely used and well-validated measure of individual differences in food approach (enjoyment of eating, eating in response to environmental food cues, and eating in reaction to adverse effect) and avoidance (responsiveness to satiety, slow pace of eating, undereating in response to negative affect, and picky/"fussy" eating) in adult (Hunot et al., 2016; Wardle, Guthrie, Sanderson, & Rapoport, 2001). The AEBQ scores (with the exception of hunger and picky/fussy eating) were linked with BMI in the predicted directions in two validation populations (Hunot et al., 2016; Mallan et al., 2017). The AEBQ's psychometric qualities have yet to be investigated in people with extreme obesity. It was designed to capture individual variability in eating pattern components that are considered to contribute to both underweight and overweight. The components of the scale were derived from the literature on eating behaviour and weight, the meaning of the items was validated in qualitative work with parents, and the test was shown to have excellent internal consistency and test-retest reliability (Wardle et al., 2001).

According to Hunot et al., 2016, the Adult Eating Behaviour Questionnaire, a self-report questionnaire based on the CEBQ, was recently developed (AEBQ). The

AEBQ was developed and validated in a British population, and it measures eight traits: four 'food approach' or 'eating onset' traits: Hunger, Food Responsiveness, Emotional Over-Eating, and Food Enjoyment; and four 'food avoidance' or 'eating off-set' traits: Satiety Responsiveness, Emotional Under-Eating, Food Fussiness, and Slowness in Eating. Correlations between appetitive qualities and BMI revealed that persons with higher BMIs scored higher on Food Responsiveness, Emotional Over-Eating, and Food Enjoyment and lower on Satiety Responsiveness, Emotional Under-Eating, and Slowness in Eating.

Appetitive qualities are remained generally constant throughout childhood, according to research (Steinsbekk et al., 2017), despite the fact that Food Approach qualities tend to increase with age, Food Avoidance begins to decline. (Ashcroft et al., 2008). This shows that children's relative place in the appetite hierarchy tends to hold over time, but that overall, internal auditing of eating behaviours reduces as children age, for example, external variables are increasingly influencing consumption. During puberty, youngsters are required to take on additional responsibilities for their daily behaviours, and eating patterns become unhealthier (Tăut et al., 2015), and these changes can last far into adulthood (Neumark-Sztainer et al., 2012). As a result, adolescence serves as an essential developmental transition stage for one of the most significant adult health behaviours associated with excellent eating habits.

Another field of investigation is important to the contemporary obesity crisis in developed nations. Rolls et al. (2006) introduced a framework (the volumetric diet) that has been demonstrated to be extremely effective in weight loss, as has the Weight Watchers eating plan (Haupt 2014). This is hypothesised if a person learns their individual oral behaviour needs, they would be able to enhance their adherence to dietary regimens and may even prevent some extreme weight situations (eating low-calorie foods that are unsatisfying because they do not allow for proper mouth action).

Consumers are more satisfied and allowed to eat less when they consume foods that fit for the preferred mouth activity.



2.4 Malaysia's Population

Consumers' sensory preferences for specific food products might be influenced by their cultural expectations for such goods. Researchers discovered cross-cultural variations in sensory preferences for drinkable yoghurt among Chinese and European customers in New Zealand (Hay et. al, 2021). However, consumer culture across Malaysia's ethnic groups has to be studied more to acquire insight into liking factors, since such drivers represent cultural expectations and the influence of mouth behaviour.

According to the Malaysian Department of Statistics, the overall population in 2010 was 28.3 million, with 91.8 percent Malaysian citizens and 8.2 percent non-citizens. Malaysians are divided into four ethnic groups: Bumiputera (67.4%), Chinese (24.6%), Indians (7.3%), and Others (0.7 percent). Malays were the most numerous ethnic group among Malaysians, accounting for 63.1 percent of the population in Peninsular Malaysia. Ibans made up 30.3 percent of the entire population in Sarawak, while Kadazan Dusun made up 24.5 percent in Sabah. To study these concepts in further depth, the Malaysian community will be chosen since it is a heterogeneous, multi-ethnic society where ethnicity is an important and substantial restraining and enabling element in organisational management.

In conjunction with Malaysia's rapid evolution, the proportion of the people living in cities climbed to 71.0 percent in 2010 from 62.0 percent in 2000. Apart from W. P. Kuala Lumpur and W. P. Putrajaya, which have 100% urbanisation, the other states with a high level of urbanisation are Selangor (91.4%) and Pulau Pinang (90.8%). Kelantan (42.4 percent), Pahang (50.5 percent), and Perlis, on the other hand, have lower levels of urbanization (51.4 percent).

Malaysia's population under the age of 15 years has declined from 33.3 percent in 2000 to 27.6 percent now. In comparison, the share of the working-age population (15-64 years old) climbed from 62.8 percent to 67.3 percent. In addition, the share of the population aged 65 and up climbed to 5.1%, up from 3.9% in 2000. As a result, the median age rose from 23.6 years in 2000 to 26.2 years in 2010, but the dependence ratio fell from 59.2% to 48.5 percent. The pattern of these indicators is consistent with Malaysia's age structure shift toward an older population.

All of the participants' characteristics, such as age and ethnicity, will be examined in demographic data and related to their oral preferences and eating behaviour. Malaysian populations' personal backgrounds, such as age, gender, and body mass index, may also have an effect on their eating or mouth behaviour.

CHAPTER 3

METHODOLOGY

3.1 Participants and Procedures

In this cross-sectional study, participants were required to take an anonymous online survey using google form. Participants were asked to voluntarily participate in this research study through social networking sites/applications such as Facebook, Twitter and WhatsApp. The whole sample for a total amount of (N=209) respondents (Malaysians over 18 and not exceeding 65 years old of any gender and ethnicity) from urban and rural communities were recruited. An overview of the research and the purpose of the participation required by the respondent is provided in the form of a written consent form for possible research participants to decide whether or not it should engage in the study. During an online survey, weight and height will also be obtained. BMI was calculated using weight and height data (a measure of adiposity expressed in kilograms per meter of height squared). This questionnaire will be developed in dual languages, Malay and English, to preserve our native language while developing an understanding of others. The translation English to Malay was adhering to WHO back translation method. There were two stages of questionnaires that was distributed and analyzed based on the data information from the participants. The first stage combined two sections which are the Food Classification section and Mouth Behaviour section, to acknowledge which preferred mouth behaviour group the

participants belong to. The second stage was the Eating Behaviour section, in which the contributor needs to complete 35 questions in order to recognize the correlation with their mouth preference group.

3.2 Measurements

3.2.1 Demographics

Respondents were asked to fill in their age, gender, and race/ethnicity. They also were requested to provide information about their body weight and height. The body mass index (kg/m²) was obtained based on self-reported data

3.2.2 Development of the Mouth Behaviour Classification Tools

People had little perception of texture to start with, so they were unconscious of how they handled objects in their mouths. People might consume things that were not optimal in texture for various reasons but would simply change their dietary behaviour or the foodstuff to make it more appealing. The original survey instrument was discovered to identify individuals sampled for mouth behaviour type and some questions to recognize which group they belonged to. Figure below showed the classification of food based on culture in Malaysia.

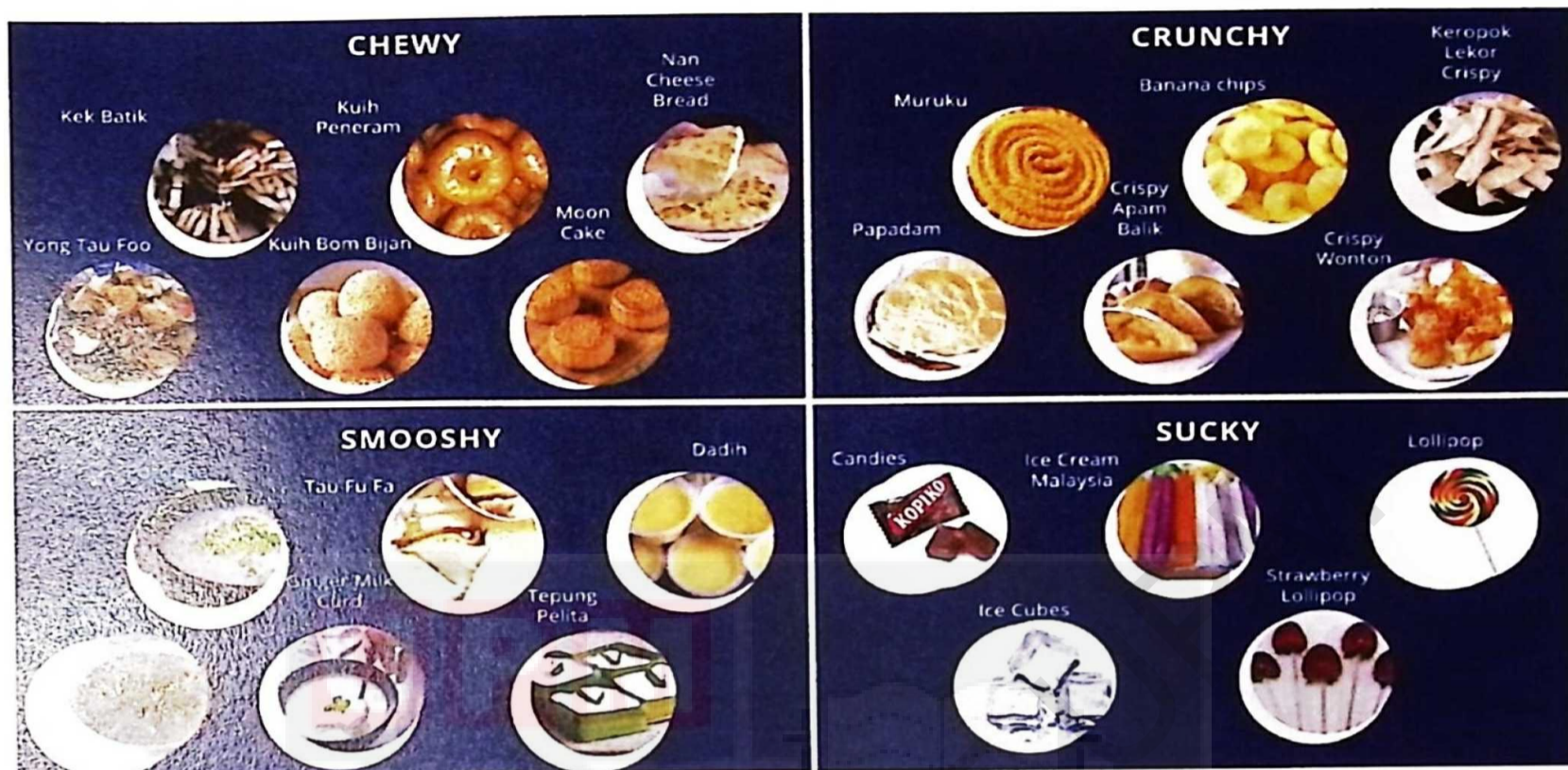


Figure 3-1: Food classification based on Malaysian food.

A visual solution was created and discovered to be an effective method of reaching the subconscious mind "Instead of expressing the ideas to explicit rational terms, the subconscious brain displays the signals to us in symbols and images," and "Kinetics inside the subconscious may be recognized via imagination that might be visible, verbal, acoustic or a combination of the three..." (Progoff, 1963). In the first section, the Food Classification section, the participants were shown four classes of foods from different main ethnic groups and asked, "Have you ever tried this food before? Which class would you classify this food as?". This segment is to know which food group they describe and how far they acknowledge the food class shown in the questionnaire. There are four options: Crunchy, Chewy, Smooshy, and Sucky.

Additionally, the second section for the online survey was administered in CATA form in the form of Yes/No, allowing the cluster analysis for the segment participants into the four categories. This section title is Mouth Behaviour section whereby this

segment asked nine questions, for instance, "Do you prefer products that you can chew?", "Do you like foods that are soft and spread through the mouth?" and "Do you prefer hard, crunchy biscuits over soft, chewy cookies?". This indicated participant's preference for mouth behaviour since the meals shown were ones which most effectively supported that behaviour. Thus, the classification of participants' preferred oral behaviour was done in several steps:

- 1) Selection of preferred oral processing behaviour based on the pictorial matrix,
- 2) Categorization of food items based on oral processing behaviour, and
- 3) Validation questionnaire oral eating behaviour.

Participants preferred oral behaviour (1) was validated against the scores collected in (2) and (3). For example, when a participant indicated that their preferred oral processing behaviour is Chewy (1), a high score of Chewy behaviour is expected from (2) and (3).

However, when a participant indicated that they are Cruncher (1) but showed a high score of Smoosher behaviour from (2) and (3), they were then categorized as Smooshers. In this study, a machine learning technique (i.e., Latent Class Clustering) was also employed to assist in the classification of participants where participants showed a mismatch of their preferred oral processing behaviour (1) supplemented ties in the validation questionnaires (2) and (3). Latent Class Clustering had been previously used by Cattaneo et al. (2020) similarly.

3.2.3 Adult Eating Behaviour Questionnaire – Approach and Avoidance

The Adult Eating Behaviour Questionnaire (AEBQ) by Hunot et al. (2016) was used in this study to investigate the eating behaviour of the Malaysian population. The questionnaire consists of a total of 8 dimensions, where four dimensions were categorized in approach behaviour (i.e., Hunger, Food Responsiveness, Emotional Over-eating, and Food Enjoyment) and four dimensions in avoidance behaviour (i.e., Satiety Responsiveness, Food Fussiness, Emotional Under-eating, and Slowness in eating) where each dimension contains approximately 3-5 questionnaire items. Items were rated using 5-point agreement scales anchored from strongly disagree to strongly agree. The four measurements were averaged further to generalize the overall approach-avoidance towards food in this study. Each of the eight scales below has three to five items; example items for each scale are supplied in parentheses. Hunger, Food Responsiveness ("when I see or smell food I enjoy, it makes me want to eat") ("if my meals are delayed, I get light-headed"), Emotional Overeating ("I eat more when I'm upset"), Emotional Under-eating ("I eat less when I'm upset"), Satiety Responsiveness ("I frequently feel full before my meal is finished"), Slow Eating ("I am frequently the last to finish a meal"), and Food Fussiness ("I frequently decide that I don't like a new food before tasting it"). Both prior validation studies called the AEBQ's eight-factor structure into question, with both groups finding a better match when the Hunger items were removed or loaded on the Food Responsiveness scale (Hunot et al., 2016; Mallan et al., 2017). Mean scores will be calculated for each subscale. The Research Ethics Committee of Universiti Putra Malaysia will also offer ethical approval. The a, b, and ab groups will be the explainable comparative parameters for each appetite classification, including the approach and avoidance traits. It implies that comparing one measurement is supposed to explain the comparison within its group (a, b, or ab). For instance, in Figure 4-3, in terms of

Hunger, the Underweight individual has a higher Hunger response and groups together with the Overweight people and Normal people as all of them share the same group. However, the Underweight individuals in Hunger are significantly different from the Obese ones because they did not share the same group. It does not work across, as it cannot compare the Underweight individual with Hunger and Food Responsiveness. It can be compared within only one measurement as a comparison explanation since they are independent of one another.



3.3 Statistical and Data Analysis

ANOVA was used to determine whether or not the survey data were significant. In other words, it helps establish whether the null hypothesis should be rejected or if the alternative theory should be supported in this investigation. When significant product impacts were seen, a mixed analysis of variance (ANOVA) was conducted on the relationship data. After the ANOVA, a post-hoc comparison was conducted using Tukey's Honest Significant Difference (HSD) test ($p < 0.05$). Subjects were categorized into Cruncher, Chewer, Smoother, and Sucker by their actual Mouth Behaviour, based on the probability of identifying the cases, using latent class clustering technique. Subjects were also classified into approach and avoidance groups based on the median of R-indices. All data analyses were performed using XLSTAT (version 2020.1.2, Addinsoft, France). The data were further analyzed by Partial Least Squares-Confirmatory Factor Analysis (PLS-CFA) to evaluate the relationship and visualize the network model. Therefore, this software was used in this study research as it is acknowledged as one of the most user-friendly statistics packages and is one of the most extensively used. Individual mean scores for each AEBQ measure obtained after CFA were computed for the complete sample. The body mass index (kg/m^2) also was calculated using self-reported height and weight data using Microsoft Excel.

CHAPTER 4

RESULTS AND DISCUSSIONS

In this section, the result obtained from the questionnaire will be discussed. The correlation between participants' preferred mouth behaviour and eating behaviour will be elucidated.

4.1 Demographics

The questionnaire was completed by 209 Malaysian respondents for adults aged between 18 and 65.

Table 4-1: Demographics distribution of age, gender, ethnicity, and BMI classification

Variable	Categories	Counts	Frequencies	%
Age	18-25	129	129	61.722
	26-35	28	28	13.397
	36-45	18	18	8.612
	46-55	26	26	12.440
	56-65	8	8	3.828
Gender	Female	140	140	66.986
	Male	68	68	32.536
	Others	1	1	0.478
Ethnicity	Chinese	12	12	5.742
	Indians	6	6	2.871
	Malays	187	187	89.474
	Others	4	4	1.914
BMI classification	Normal	119	119	56.938

Obese	25	25	11.962
Overweight	35	35	16.746
Underweight	30	30	14.354

Table 4-1 showed the data distribution of all respondents who completed the survey in 30 days. In terms of age, the group that contributed is in the range of 18-25 years old, where the majority number is 129 people out of 209 (61.7%). The content of ages between 26-35 years old has 28 counts (13.4%) and 26 people for age between 46-55 years old (12.4%). In the age group between 36-45, the number of respondents that play a part in this survey is 18, whereas it comes out with 8.6%. The least counts for the age group of 56-65 years old were only 8 out of 209 respondents, and its percentage is 3.8%. The highest percentage of the age group involved were all teenagers, and the least counted were the elderly. According to Mahmutovic (2021), older generations are less likely to participate in surveys. They are much less likely to engage in online surveys because 25% of this group does not have access to the internet. In-person interviews, telephone poles, and mail-in polls may be preferable.

Moreover, in the context of gender, the majority of 140 female respondents (67%) participated in this study, while 32.5% for the male gender since the table indicated only 68 people. Others were only one person, perhaps because they did not want to reveal their gender and remain unknown. According to some scientists, females are more likely to engage in online directly relevant conversation and information exchange. In contrast, males are more likely to engage in online activity classified by information searching (Jackson et al., 2001). Responding to an email by completing an online survey, answering it, and submitting it is more of an information-exchange procedure than an information-seeking activity. From this perspective, it is understandable that females responded at a higher rate than males.

Furthermore, 187 (89.4%) Malays were likely to participate in this online survey. From Table 4-1, 12 Chinese respondents have a percentage of 5.7%, and Indian respondents showed six people out of all participants (2.9%). Other than that, only four people, which exhibit 1.9% of the percentage, were possibly from Iban or Kadazan ethnic or any different ethnic as long as they are Malaysians. According to the Malaysian Department of Statistics, Malaysian residents are constituted of the ethnic groups Bumiputera (67.4 percent), Chinese (24.6 percent), Indians (7.3 percent), and Others (0.7 percent). Malays were the most prevalent ethnic group among Malaysians, accounting for 63.1 percent of the population in Peninsular Malaysia. This statement proved why the Malay respondents have higher values than the others.

Additionally, BMI was calculated to acknowledge their classifications of body mass index, which will correlate in a further study that is relatable with eating behaviour. In this study, Table 4-1 showed the highest percentage of BMI, which is 56.9%, where 119 respondents have normal BMI. Thirty-five respondents are overweight (16.7%), while 25 are obese (11.96%). There are also 30 it has an underweight body mass index (13.4%). The BMI is calculated by dividing the body mass by the square of the body height and is represented in kilograms per square meter (kg/m²). BMI for each participant was calculated in further discussion to recognize how BMI may influence eating behaviour. Is it significant or has no effect at all? Table 4-2 below shows the BMI classifications with a range of classified numbers.

Table 4-2: BMI classifications.

Classifications	BMI (kilogram/m²)
Underweight	<18.5
Normal weight	18.5-24.9
Overweight	25-29.9
Obesity	30-40

4.2 Chewers, Crunchers, and Smooshers were prominent in the Malaysian population

It was postulated by Cattaneo, Liu, Bech, Pagliarini, and Bredie (2020) that the Asian population would have preferred soft palate oral processing behaviour. They classified customers into two groups based on their desired oral food processing: 'soft processing likers' and 'hard processing likers.' In their study, there were cross-cultural variations in preferred oral processing behaviour, with Chinese respondents preferring to handle foodstuffs between the tongue and the roof of the mouth. On the opposite, Danish respondents preferred to break down meals in their mouths using their teeth. They concluded that Asian Chinese customers were characterized as selecting meals that require softly oral processing.

In contrast, Caucasian Danish consumers preferred items that required firmly oral processing, as confirmed by North American consumers (Jeltema, Beckley, & Vahalik, 2015). Another latest study from Ketel et al. (2021) also has a similar epilogue since the Chinese (Asian) consumers were directed to spit out the meals at the point of swallowing. In contrast, the other study's Chinese (Asian) adults were advised to swallow the food. Pilot research showed that many Chinese (Asian) older persons experienced uncomfortable swallowing carrots because they were considered quite stiff.

However, this was not the case in the current study, where we found an equal population of Chewers ($n = 72$), Crunchers ($n = 69$), and Smooshers ($n = 63$), which is shown in Figure 1. ($F_{(15, 208)} = 2.482$; $p < .05$). We found an extremely small population of Suckers ($n = 5$). This was probably since foods in their study were not adapted accordingly to the local context and culture. A study done by Plaza et al.

(2019) had shown that contextual and cultural information could be crucial in providing ecological validity, as such Asian individuals may not necessarily consume the food that was established in the original questionnaire and therefore introducing unfamiliarity bias. The study from the references article mentioning Chinese is actually from China, located in East Asia. At the same time, Malaysia has a diversity of multiracial human beings and is located in South Asia. Although China and Malaysia are in Asia then, both the countries are located in different states; therefore, their unique foodstuff culture might have their preferred mouth behaviour. Based on Figure 4-1, we can conclude that Malaysian loves Chewy, Crunchy, and Smooshy foods. They needed to use their teeth to break down the foods, or some people might prefer meals that broke up upon biting or favored soft meals that diffused all over the tongue and can be held in for a longer period without requiring much mouth action. Malaysians are less likely to enjoy tougher items that could be sucked on for an extended period, such as lollipops and products that could be held in their mouths. This is probably in Malaysia, it may have a limited variety of sucky foods, especially in the context of traditional foods. The sucky foods we have discovered are just a few, for instance, lollipops, candies, or maybe ice cream. Malaysians categorized as Crunchers probably just forcefully bite the lollipop or hard candies using their teeth rather than sucking them up.

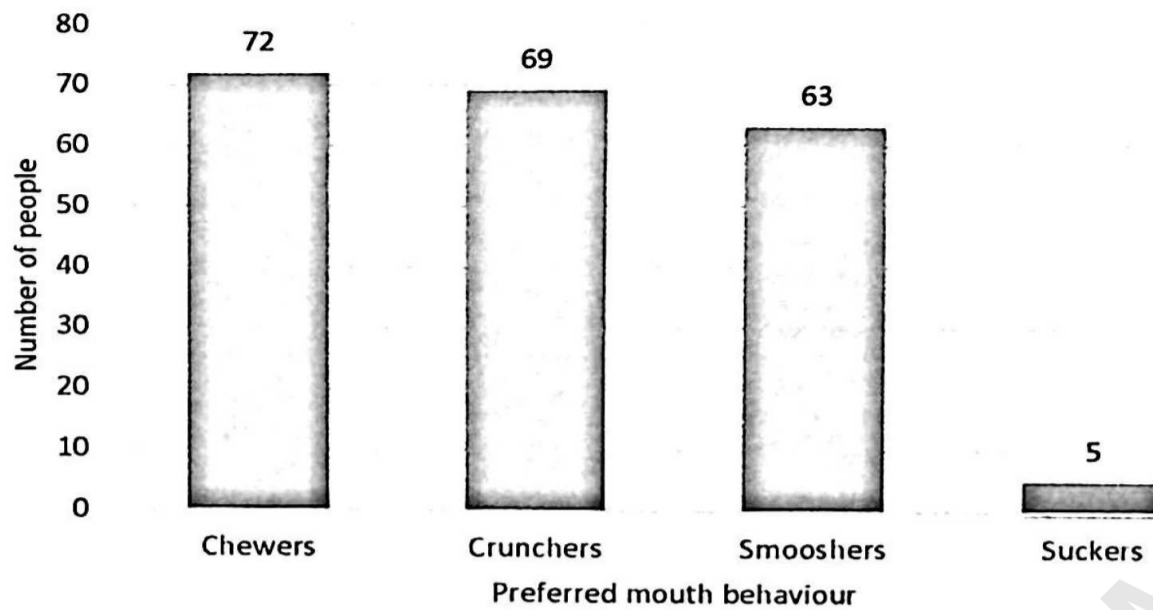


Figure 4-1: Distribution of Malaysian consumers preferred mouth behaviour.

To give a supportive system according to the trend above, Malaysians are less likely to have a soft spot for sucky foods, most likely due to a restricted variety of sucky products in terms of cultural and traditional cuisine. Malaysians, on the other hand, prefer chewy, crunchy, and smooshy foods since there is a wide range of cuisine variation in these three categories, particularly in ethnic foods. For example, 'Muruku' is an Indian traditional crunchy delicacy that Malaysians enjoy for its crispiness and delightful snack. 'Tau Foo Fah' from smooshy Chinese goods is also always available at the night market, which frequently sells out, and it is so much enjoyable when consumed. Tau Foo Fah is a Chinese delicacy made of very soft tofu that is served with a clear sweet syrup flavoured with ginger or pandan. Finally, chewy foods such as Kek Batik, which is popular among Malays, may be enjoyed by Chewers due to their hardness or stickiness, which necessitates extensive chewing during the oral processing. In this country, cultural cuisine contains a wide variety of meals, particularly chewy, crunchy, and smooshy dishes. As a result, Malaysians tend to be Crunchers, Chewers, or Smooshers instead of Suckers since sucky foods in Malaysia is limited or probably they did not enjoy tougher foods that they can hold in their mouth for extended periods of time.

4.3 Different preferred mouth behaviour showed difference in avoidance behaviour

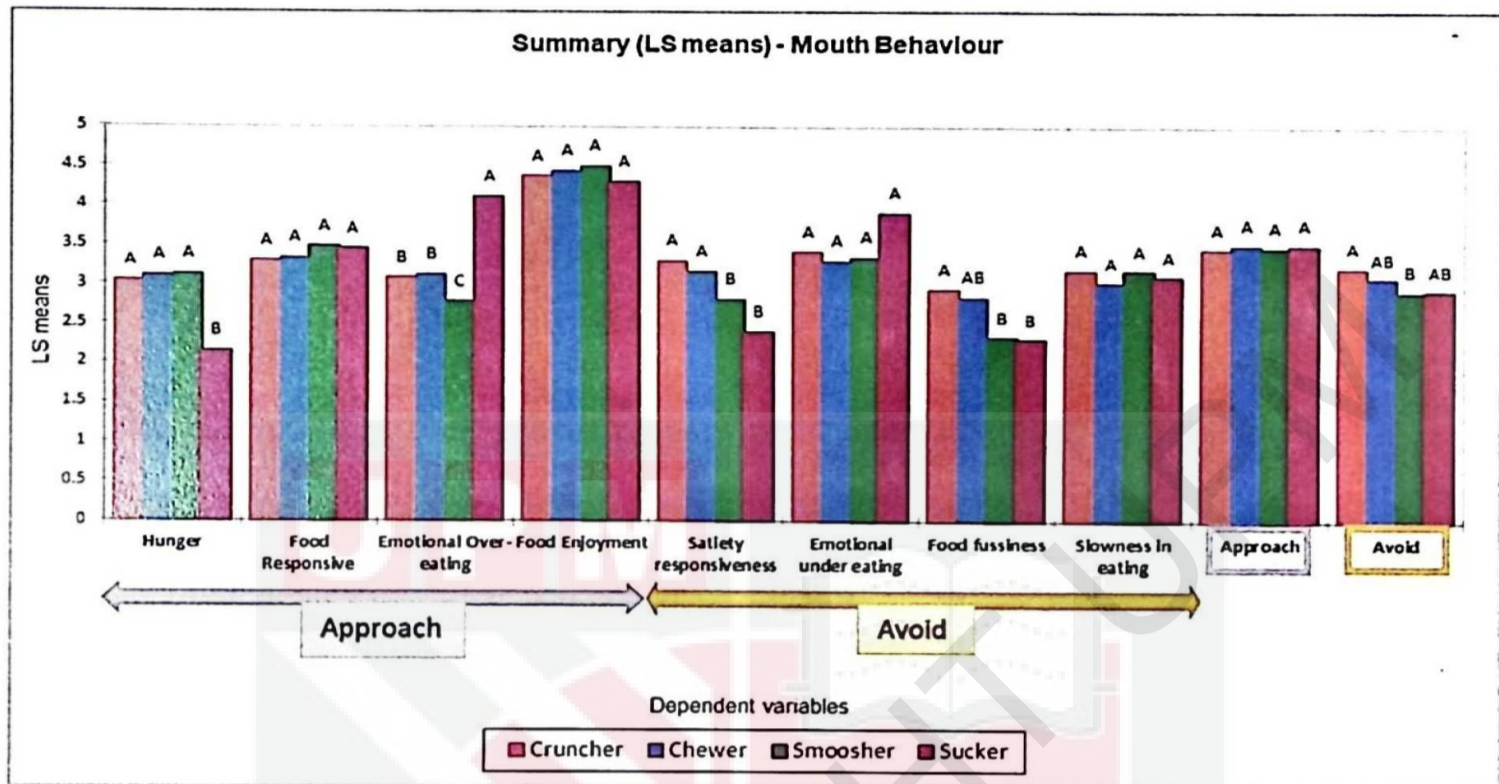


Figure 4-2: Relationship between Mouth Behaviour and Appetitive traits

This study was the first to investigate the relationship between eating behaviour and preferred mouth behaviour. The Mouth Behaviour category will be discussed regarding the approach and avoidance behaviour, whereas stated in the methodology section, the approach indicates a propensity to move toward or desired foodstuffs. In contrast, avoidance indicates a propensity to move away from it. From the investigation, Crunchers was shown to have the highest avoidance ($\bar{x} = 3.19$), followed by Chewers ($\bar{x} = 3.06$) and Suckers ($\bar{x} = 2.91$) and being significantly different from Smooshers ($\bar{x} = 2.90$) ($F_{(15, 208)} = 2.941$; $p < 0.05$). It can be concluded that avoidance behaviour was significantly different when comparing the mouth behaviour groups. Interestingly, no significant difference was observed for approach behaviour within the group.

On the one hand, two dimensions of the approach, namely Emotional Over-eating and Hunger, reached significant levels of 5% and 10%, respectively. It was shown that Suckers showed a significantly lowest rating of Hunger compared to the other groups while showing the highest rating, particularly in Emotional Over-eating followed by Crunchers and Chewers in the same grouping and Smooshers being significantly lowest. Although there was no significant difference in approach behaviour, it is worth mentioning that the Hunger in Approach Behaviour was near 10%, which is marginally substantial since human behaviour is not easy to evaluate.

On the other hand, two dimensions of avoidance, namely Satiety Responsiveness and Food Fussiness, reached a significant 5% level. For this particular case, the Cruncher was significantly different compared to Smoosher. However, there is a Cruncher, Chewer, and Smoosher group since they share the same 'A.' It was a piece of evidence where Satiety Responsiveness for Crunchers and Chewers were significantly higher compared to Smooshers and Suckers. It is also compounded by the fact that Crunchers in Food Fussiness have been shown the highest score and did not sign with Smooshers and Suckers because they are not in the same group. This implies that these two traits in avoidance behaviours are sufficiently the most important parameters in describing the eating behaviours of Malaysian people. In specific terms, 'Satiety-Responsiveness' analyses the capacity to regulate food intake in connection to satiety; meanwhile, picky and restricted food choices are characteristics of 'Food Fussiness.' Thus, it can be concluded that Crunchers are categorized as the pickiest eater and satiety responders compared to other mouth behaviour since Satiety Responsiveness and Food Fussiness drive avoidance behaviour among the participants. Smooshers and Suckers can be comparable as the values have no large difference.

4.4 Underweight individuals show stronger avoidance behaviour towards food

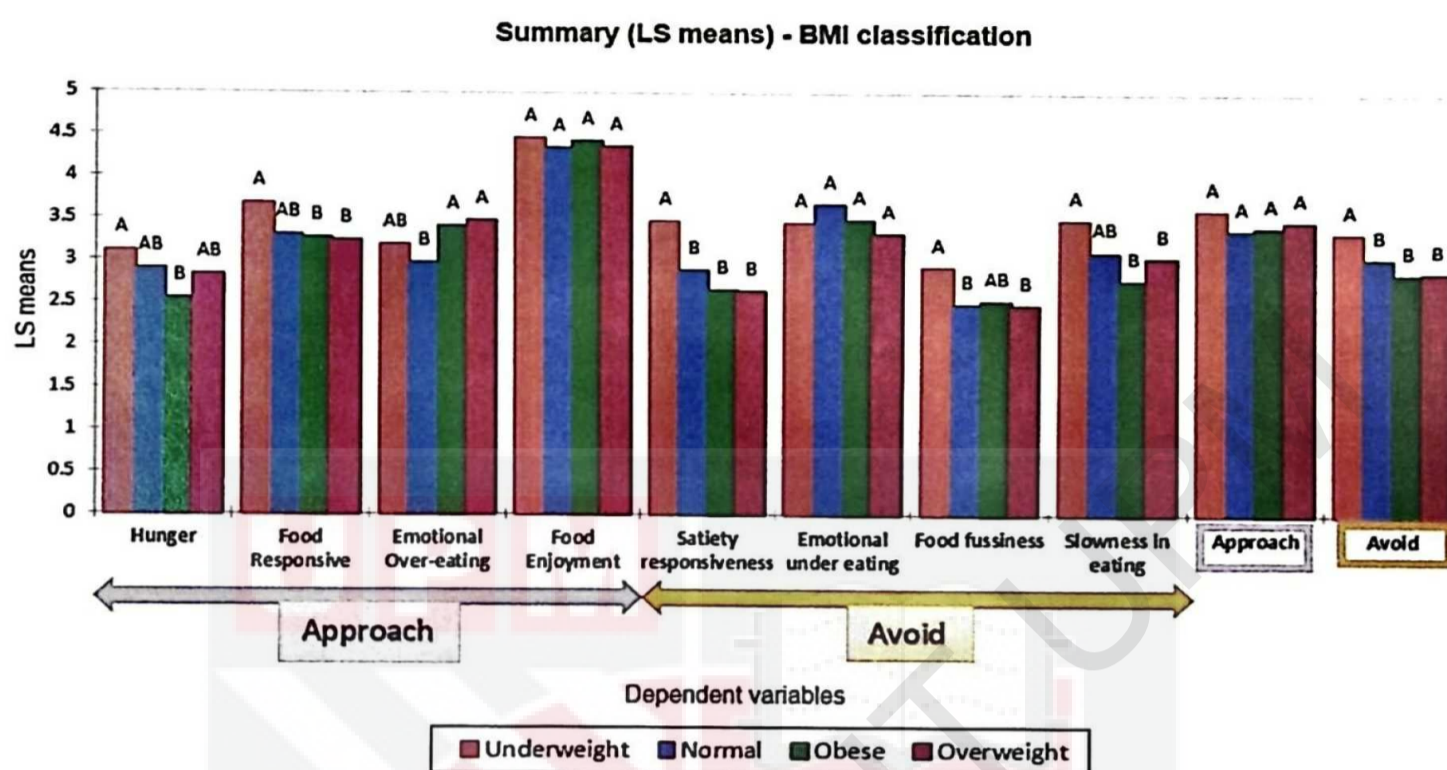


Figure 4-3: Relationship between BMI classification and Appetitive traits

The associations identified between appetitive behaviours and BMI in this study are comparable to findings from the Malaysian literature, where underweight is consistently favourably linked with 'food avoidance' scales of the AEBQ and negatively associated with 'food approach' scales. This graph showed Underweight individuals have significantly higher avoidance behaviour compared to normal, overweight, and obese individuals ($F(15, 208) = 3.737 ; p < .05$). The connections with both appetitive traits and BMI discovered in this study are quite similar to those found in another research, Hunot, C., Fildes, A., Croker, H., Llewellyn, C. H., Wardle, J., & Beeken, R. J. (2016), where adults with a higher BMI scored higher on 'food approach' traits (F.R., EOE, and E.F.) and lower on 'food avoidance' traits (SR, EUE, and SE).

Moreover, Satiety Responsiveness reached a significant 5% level from avoidance behaviour. In this dimension, the Underweight ($\bar{x} = 3.47$) individually showed the highest score and could not compare with the other classifications as they did not share the same group. However, Food Fussiness and Slowness in Eating both have marginally significant levels of 10%. This implies that these two traits in avoidance behaviours also may be sufficiently important parameters in describing the eating behaviours of Malaysian people. It is conceivable that adults' Food Fussiness is geared toward a considerably smaller range of items, whereas children's Food Fussiness varies more (Croker et al., 2011, Spence et al., 2011, Webber et al., 2009). Picky eating in adults is also linked to unhealthy eating, leading to higher BMIs in some circumstances (Kauer, Pelchat, Rozin, & Zickgraf, 2015). However, the association between Food Fussiness and BMI in people has not always been constant (Santos et al., 2011, Svensson et al., 2011). Furthermore, adults may intentionally restrict their energy intake to regulate their weight, reducing the impact of certain features on BMI. Future research should examine the relationship between the AEBQ and dieting or restricted eating behaviours.

On the other hand, Emotional Overeating achieved a considerable level of 5% of the approach traits. It was discovered that the Overweight ($\bar{x} = 3.47$) group had a considerably higher rating than the other BMI groups. Still, the Normal group ($\bar{x} = 2.97$) had no relevance because they did not share the same group. It is because they were usually eating to suppress or soothe negative emotions like stress, anger, fear, sadness, loneliness, or boredom. People who emotionally eat consume food several times per week or more to suppress and soothe negative emotions. They may even feel guilty or ashamed after eating this way, leading to a cycle of overeating and related problems, such as weight gain. This can be proved by Brytek-Matera et al. (2018) since emotional eating can be viewed as an unhealthy eating habit that disrupts the natural

sensations of hunger and satiety and leads to body image problems. According to that studies, overweight people are more likely than normal-weight people to consume under the effect of experienced emotions. This statement is supported by Marks & D.F. (2015), excess body mass is associated with high levels of negative emotions, intense body dissatisfaction, and frequent consumption of high-calorie foods. This theory confirms the assumption that food can act as a regulator of emotional state



4.5 Younger group showed high food approach behaviour

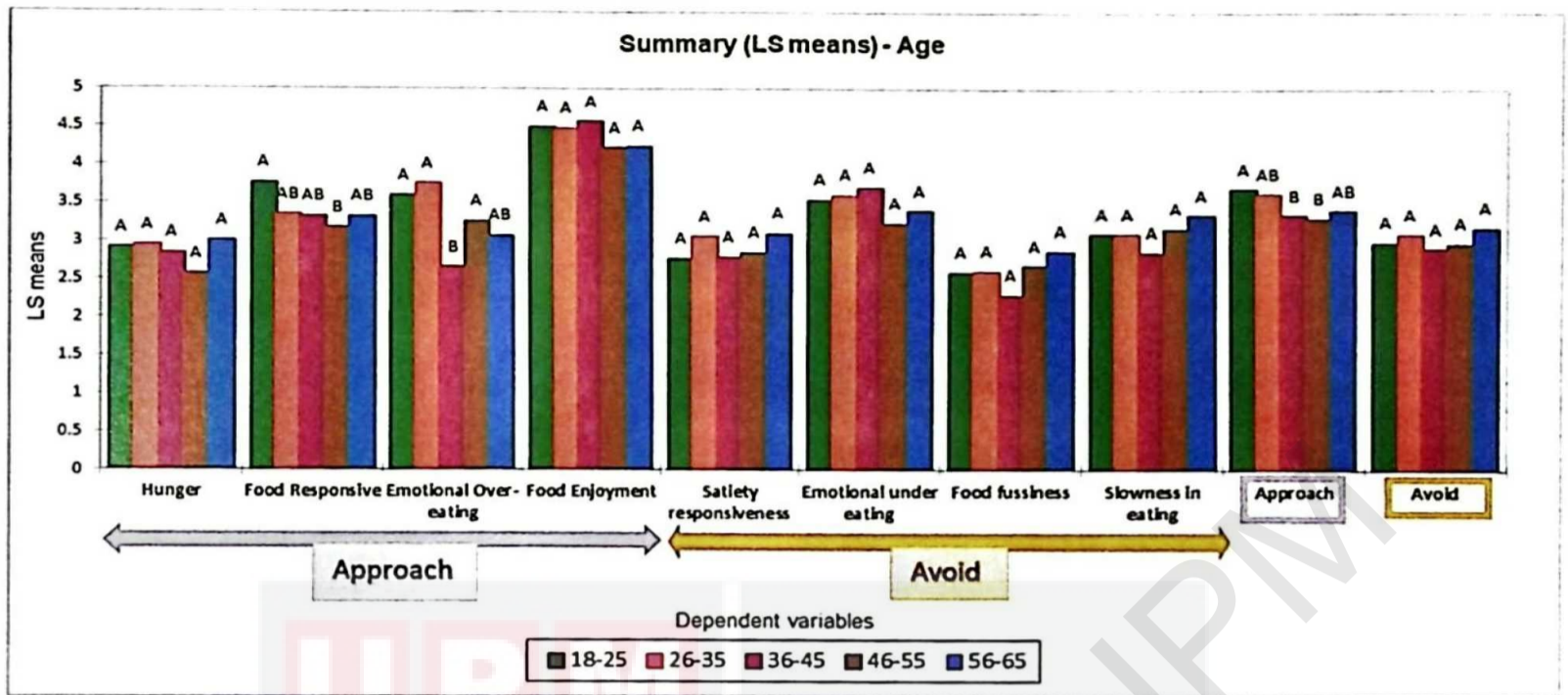


Figure 4-4: Relationship between Age group and Appetitive traits

The relationships shown in this study between appetitive behaviours and age group are equivalent, but with the youngest and oldest groups consistently associated with 'food approach' behaviour. This age group have an ideas involving a tendency of craving for eating. This graph showed the youngest of (18-25) and (26-35) of age group has significantly higher approach traits compared to other age groups. ($F_{(15, 208)} = 2.482; p < .05$).

On the terms of age group, approach behaviour was significantly difference where we observed the youngest group between 18-25 years old ($\bar{x} = 3.68$) has the highest score of approach behaviour. This was interestingly followed by older group 26-35 years old ($\bar{x} = 3.62$) and the oldest group between 56 to 65 years old ($\bar{x} = 3.39$). It is interesting to know that the approach behaviour decreases when the age is between 36 until 55 years old. The approach behaviour were mostly driven by Food Responsiveness and Emotional Over-eating with p value of 5% respectively. In terms of Food Responsiveness, it was highest in the youngest group (18-25) and followed by (26-35), (56-65) and (36-45) age of group. In the meantime, Emotional Over-eating

was led by (26-35) age of group and followed by (18-25), (46-55), and (56-55). These concepts might be comparable with some research from Dakanalis et al, (2013) where in relation to age, their study found that the oldest-old people reported considerably reduced emotional eating than younger-old people. These findings are consistent with those obtained by Braet et al. (2008) and Bailly et al. (2012), who discovered that the prevalence of emotional eating increased with age. Nonetheless, it should be noted that in the Bailly et al. (2012) study, the authors used a shorter version of the DEBQ adapted for an older population and compared two age groups (65-73 versus >73 years old), and Dakanalis et al, (2013) compared with 20-35-year-olds to 35-63-year-olds. Therefore, it might be differing since in this study we compare with every each different of group starting from 18 to 55 years old. As a result, the lack of statistically significant differences in this study could be attributed to the individuals' age.

In other perspective in terms of age, some study according to Kenel et.al., (2016) found that Chinese (Asian) young adults performed better in terms of mastication, saliva flow rate, and oral cavity volume. Bite force decline with age could be caused by decreasing bite power. Access to dental care may have altered elderly persons' dental status. This probably will be the reasons why the younger group tends to eat more rather than the elderly. In the similar concept with the study from Ketel et al (2019), elders ingested all foods with a longer consuming duration (s), greater average bite size (g), and lower eating rates (g/s) than young consumers.

Logically, for age factors, the youngster must have tendency to eat more foods especially with crunchiness, crispiness, and also chewiness of the foods due to the fact that they have higher number of teeth so that it easier for them to consume it. Unlike the elderly, the elder they are, the less number of teeth they have. Thus, from that statement the elderly might love more on smooshy foods where they are able to just

swallow it without any time consuming. However, in this study of eating behaviour, there are no findings found which relatable with the age and mastication performance but then the specific study about this among Malaysian would be interesting.



4.6 No influence of ethnicity and gender was found

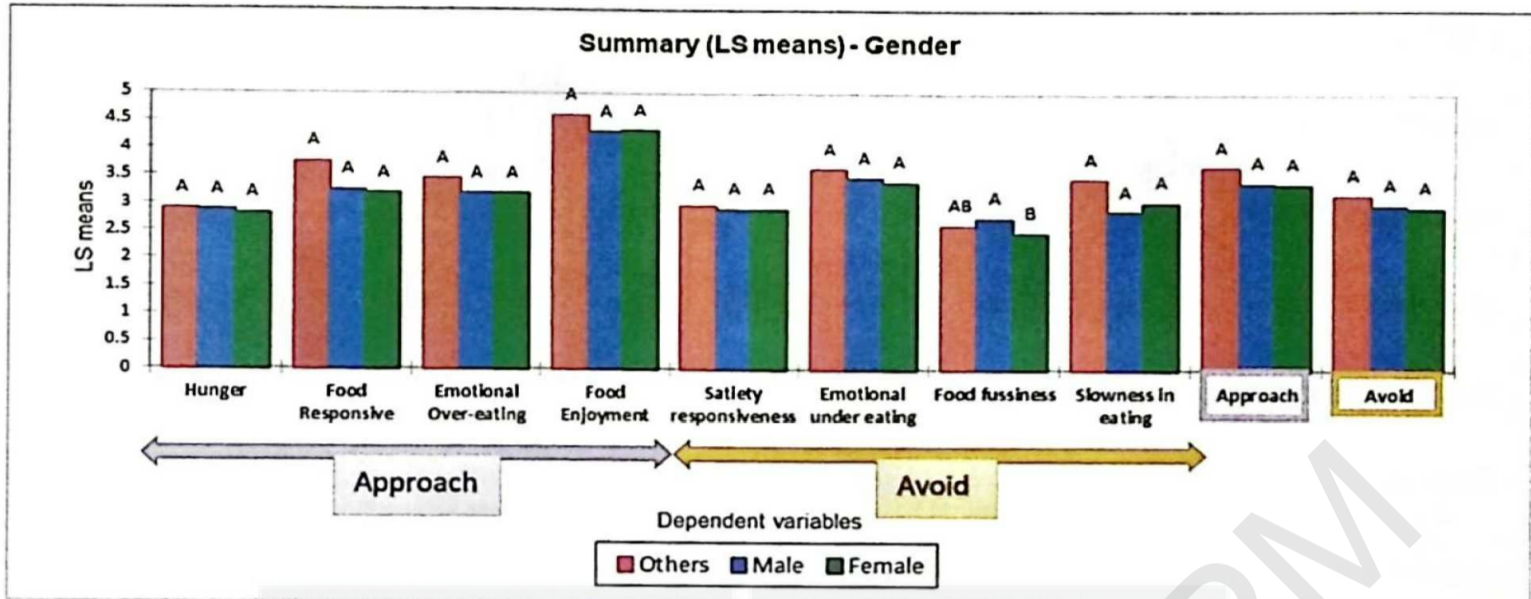


Figure 4-5: Relationship between Gender and Appetitive traits

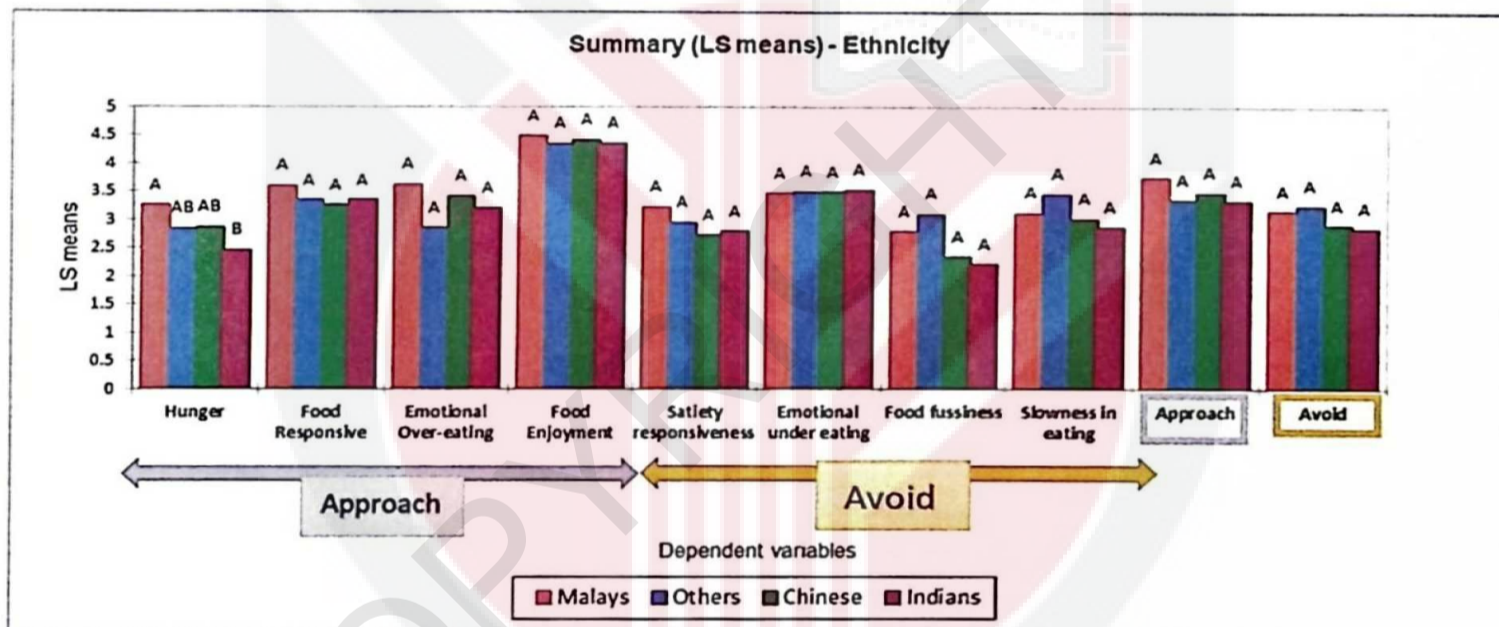


Figure 4-6: Relationship between Ethnicity and Appetitive traits

Additionally, previous research indicated that women are more prone towards emotional and restricted eating than men. Men are more concerned about enhancing musculature than with losing weight. According to Bailly et al. (2012), women are more prone to diet due to food concerns and a fear of gaining weight. (Bailly et al., 2012, Burton et al., 2007, Flament et al., 2012, Larsen et al., 2006, Van Strien et al., 1986, Wardle, 1987). However, there was no significant difference in terms of gender and ethnicity that are correlated with the eating behaviour found in this study. There

have also been the same results from another research by Ketel et al. (2019), whereas gender did not affect eating behaviour for any of the three food groups. A study of the average score by gender and ethnic group for each subscale indicated similar trends, with the averages of both parameters increasing across both categories. However, there were no other significant interactions, so the datasets were merged for further analysis. Ethnicity is not significant in this study since in Malaysia, even though there are a lot of ethnic, all of this country's communities are well exposed to other cultures and traditional food. For instance, 'Roti Canai' is Indian food. However, Chinese and Malay eat the food for breakfast without hesitation. Thus, it can conclude traditional food in Malaysia that comes from a variety of culture are well enjoyed among Malaysian people.

4.7 Network analysis of four oral processing behaviour

a) Chewer

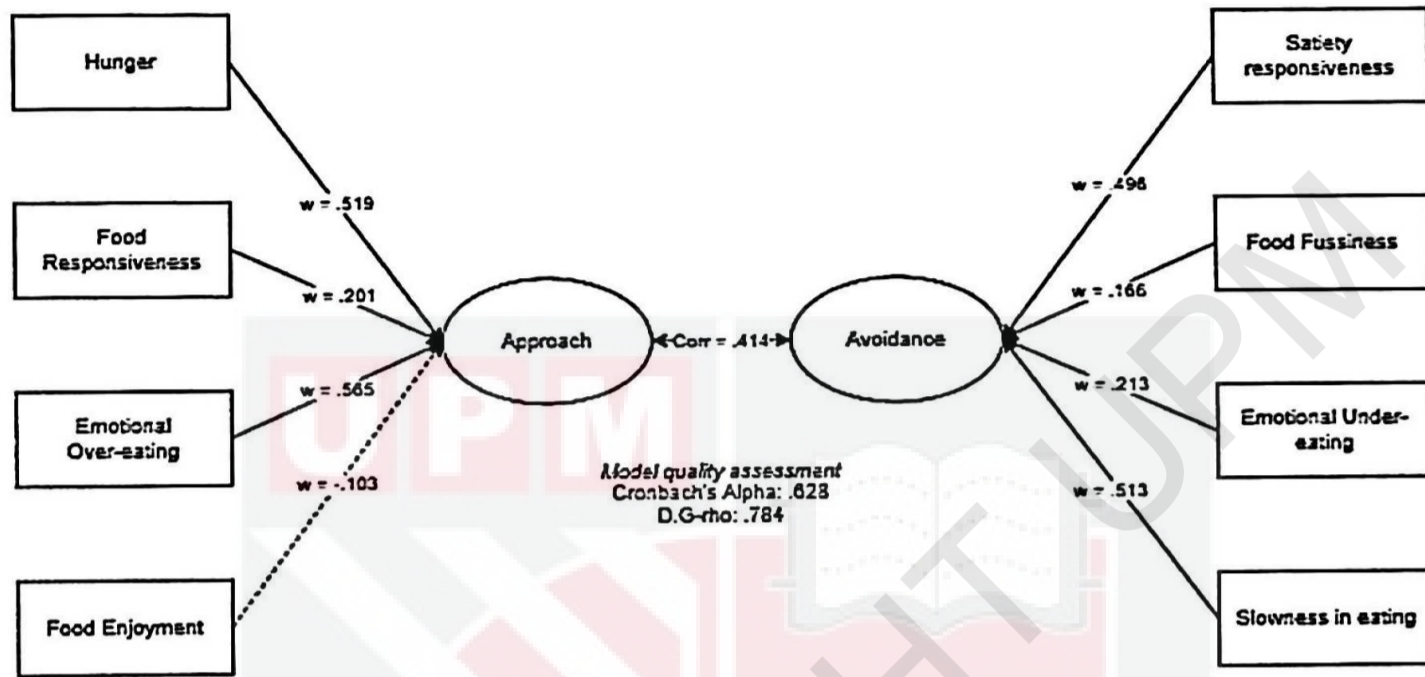


Figure 4-7: PLS-CFA of Chewer

b) Cruncher

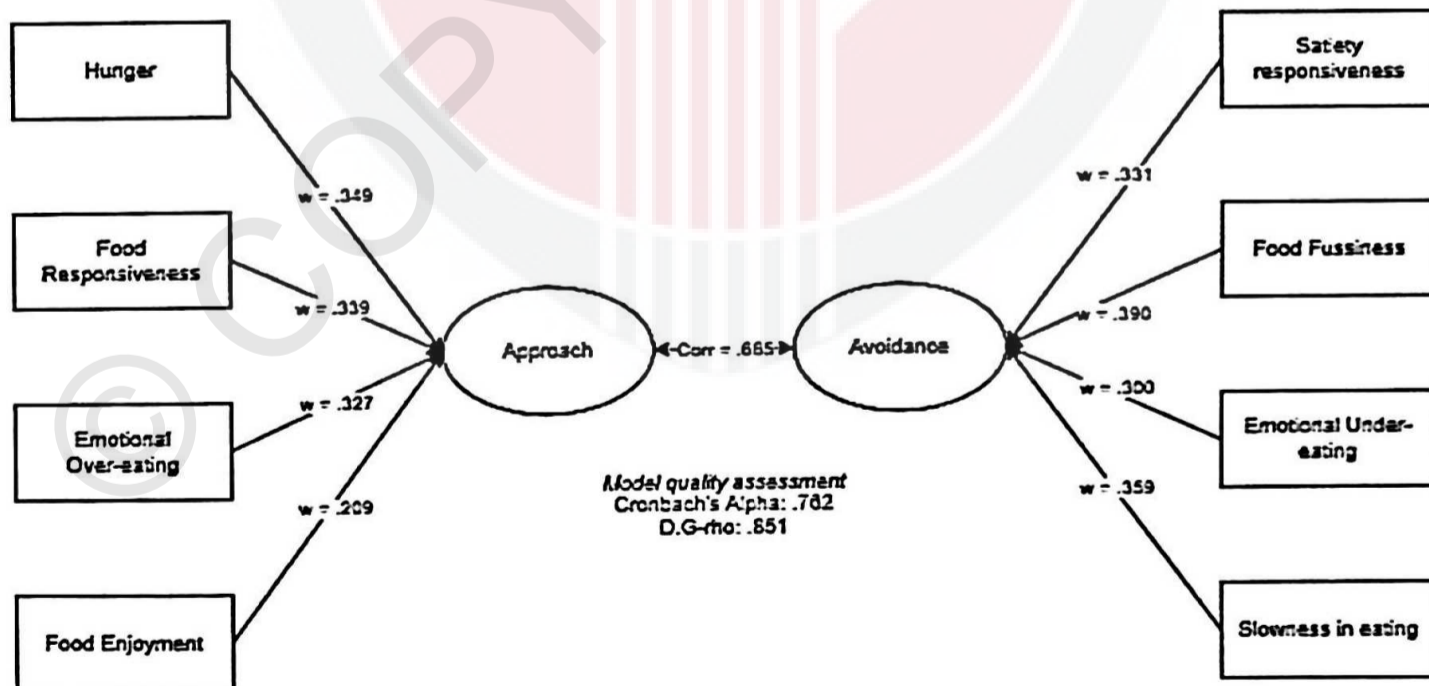


Figure 4-8: PLS-CFA of Cruncher

c) Smoosher

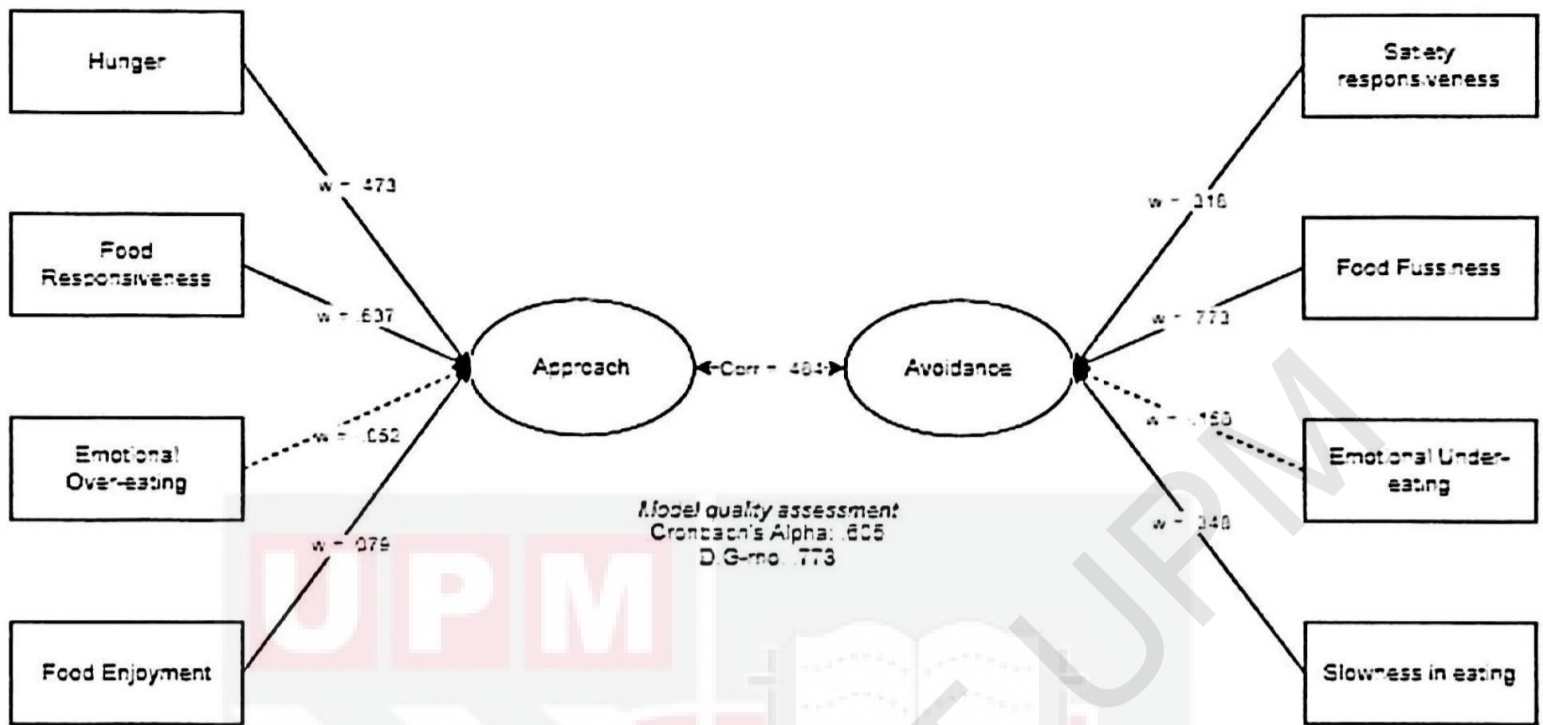


Figure 4-9: PLS-CFA of Smoosher

d) Sucker

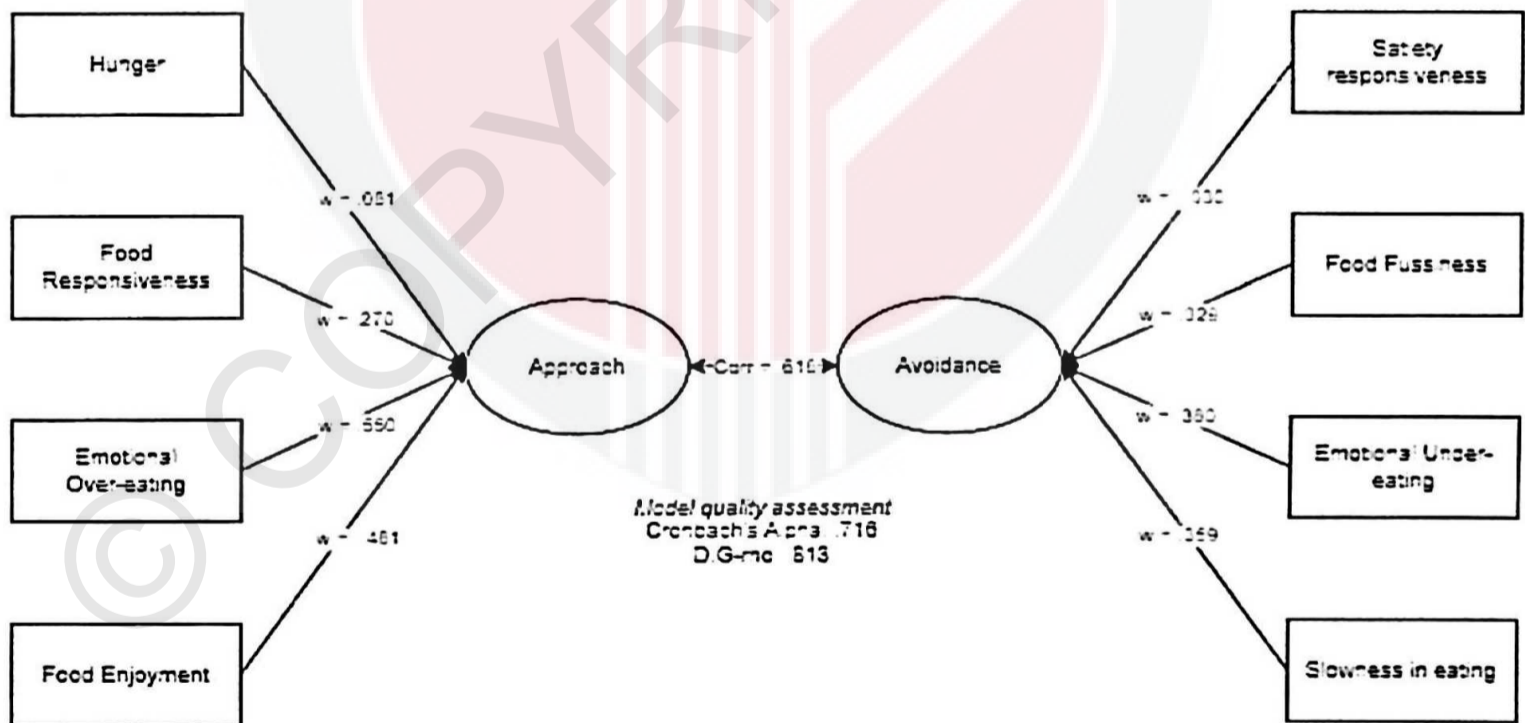


Figure 4-10: PLS-CFA of Sucker

The figure above shows the Partial Least Squares-Confirmatory Factor Analysis (PLS-CFA) of four oral processing behaviour (a) Chewer, (b) Cruncher, (c) Smoosher, (d) Sucker. Each dimension's weights were measured for approach and avoidance behaviour. The solid line showed positive weight, while the dotted line showed negative weight.

For chewers, it was shown in Figure 4-7 that emotional over-eating ($w = .565$) and hunger ($w = .519$) had the highest weighing, followed by food responsiveness ($w = .201$), while food enjoyment showed a negative relationship towards approach ($w = -.103$). For avoidance, slowness in eating ($w = .513$), satiety responsiveness ($w = .496$) had the highest weighing, followed by emotional under-eating and food fussiness. It implies that, chewers groups tend to be hungry and have an urge to eat when they see, smell, or taste attractive food, thus they have a tendency to approach the foods and consume it. In contrast with the food avoidance, chewer groups eat the foods very slowly since they must chew their food properly before swallowing probably to the reduce calorie intake and lose weight since there are several studies have found that people with weight problems tend to chew their food less than people with normal weight do (Park et al, 2015). In one investigation, researchers asked 45 volunteers to eat pizza until they were satisfied while chewing at various speeds, including normal, 1.5 times the usual pace, and double the normal rate (Zhu et al, 2014). Those who chewed up to 1.5 times as much as usual had a 9% reduction in caloric intake, while those who chewed twice as much saw a 15% reduction. Another small study found that when the number of chews each mouthful increased from 15 to 40, calorie consumption dropped and satiety hormone levels rose (Li et al, 2011). The amount of chewing you can accomplish while still enjoying a meal may be limited. A research indicated that chewing each bite for 30 seconds lowered the likelihood of snacking at a later time, but it also considerably diminished the enjoyment of the meal itself (Higgs

et al, 2013). This proved that chewers also eat very slowly according to achieve their satiety thus, they tend to eat less and after that do not have a desire to consume more foods.

For crunchers in Figure 4-8, food enjoyment ($w = .209$) showed positive relationship in food approach but then it is the lowest values among other dimensions. Hunger ($w = .349$), Food Responsiveness ($w = .339$), and Emotional Over-eating ($w = .327$) shows similar with high weighing towards food approach. In avoidance traits, Food Fussiness ($w = .201$) has the highest values followed by Slowness in eating ($w = .359$), Satiety Responsiveness ($w = .331$), and the lightest in weighing is Emotional Under-eating ($w = .300$). Crunchers same with chewers when they view, smell, or taste appealing food and get hungry but with an additional significant factor which is they have an emotional when eating which they have a tendency to overeat in response to negative emotions. Besides slowness in eating, crunchers also probably will be a picky eater where as they will have a feelings of unwillingness to eat unfamiliar foods or to try new foods so that they will avoid foods and similar with the other appetitive traits, they will tend to have an emotional when eating due to stress or unfavourable feelings that happens and may be important for the formation of future eating disorders, including anorexia nervosa. All the values are comparable even if emotional weighing is the minor overall dimension. Thus, the parameters can also be considered.

In Figure 4-9, Smooshers usually do not prefer chewing action, for approach behaviour led by Food Responsiveness ($w = .637$) and Hunger ($w = .473$). Food Enjoyment ($w = .079$) has quite less weight than the two dimensions that lead, but Emotional Over-eating ($w = -.052$) has a negative weight towards food desire. Moreover, in avoidance traits, the least weighing is Emotional Over-eating ($w = .158$). Food Fussiness ($w = .773$) showed the highest values followed by Slowness in eating ($w = .348$), and Satiety Responsiveness ($w = .318$) towards food avoidance. After all

the things considered, Smooshers, also same with Chewers in terms of Food Approach nonetheless these kinds of mouth behaviours has no propensity of emotional eating. Smooshers might not feel any emotional feelings when it comes to food. Both appetitive traits have negative weight. Thus, smooshers usually relax and calm people towards their meals any eating behaviour. However, smooshers which have an avoidance trait has a high tendency to choose the foods and the urge to be highly selective about what meals they will consume since the values in Food Fussiness is greater than the others.

As well as that, in terms of Sucker in Figure 4-10, the highest weighing values is Emotional Over-eating ($w = .550$), followed by Food Enjoyment ($w = .481$), Food Responsiveness ($w = .270$), and Hunger ($w = .081$) in food approach behaviour. However, in food avoidance showed Emotional Under-eating ($w = .380$) has highest values and then follow in order with Slowness in eating ($w = .359$), Food Fussiness ($w = .329$), and Satiety Responsiveness ($w = .030$). This shows that suckers will have a propensity to enjoy their foods and can be emotional towards them. This is because, due to the stress or heartbroken feelings, suckers will consume more foods and they really enjoy during the period. For instance, suckers will enjoy suckling up the lollipop for an extended period because of the pressure of their life burden.

In sum, all mouth behaviour groups have the weighing that leads them to comprise what, when and how much to eat. In a food desire, Cruncher has a propensity to be hungry, Chewer and Sucker probably will be overeating due to the negative emotions, and Smooshers will fall into food responsive where they urge to eat when they see or smell foodstuff. In a movement away from food, Cruncher and Smooshers tend to become fussy, Chewer will have slow eating, and Sucker is probably emotional regarding food.

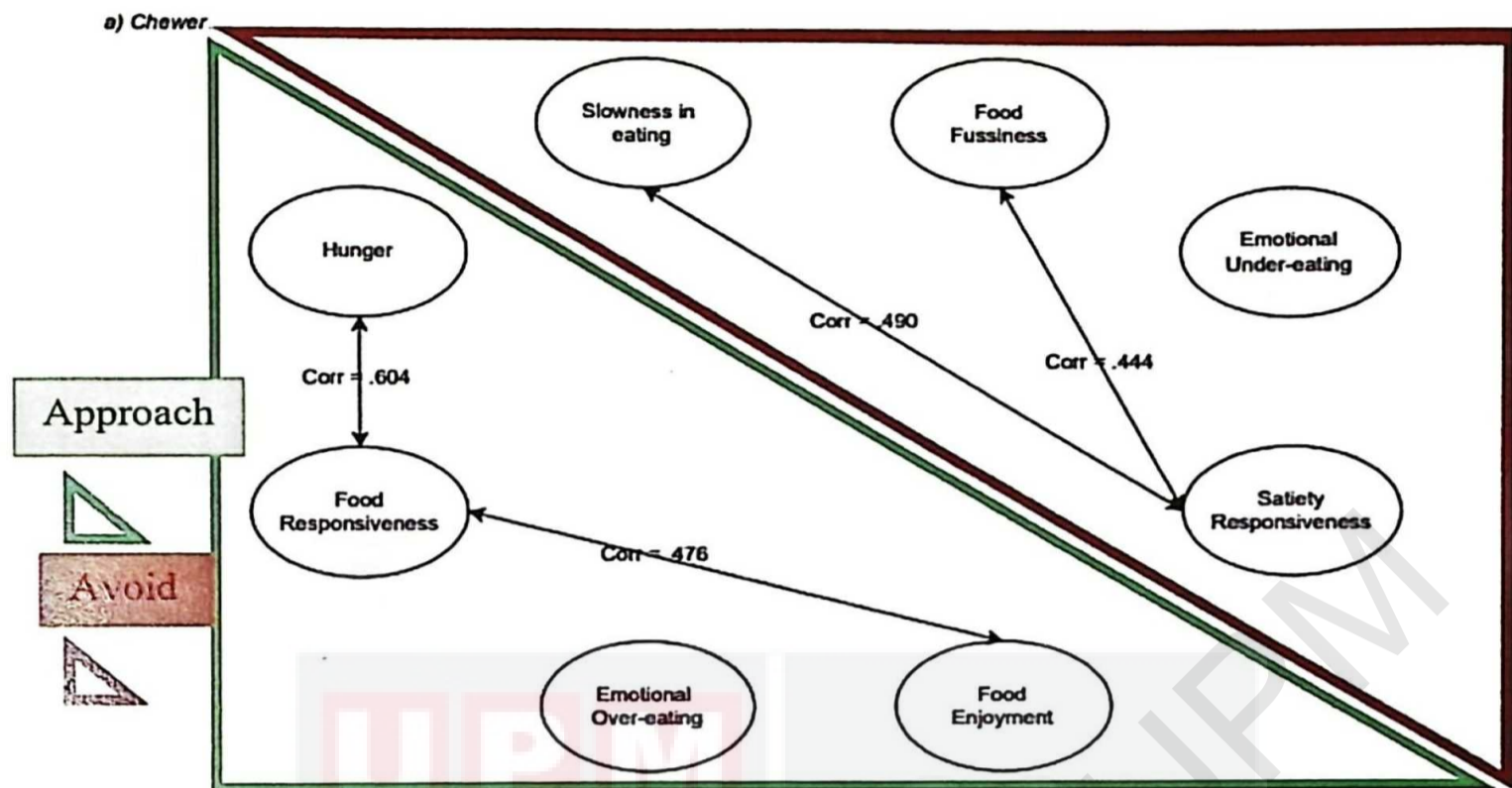


Figure 4-11: PLS-CFA of individual items for Chewer

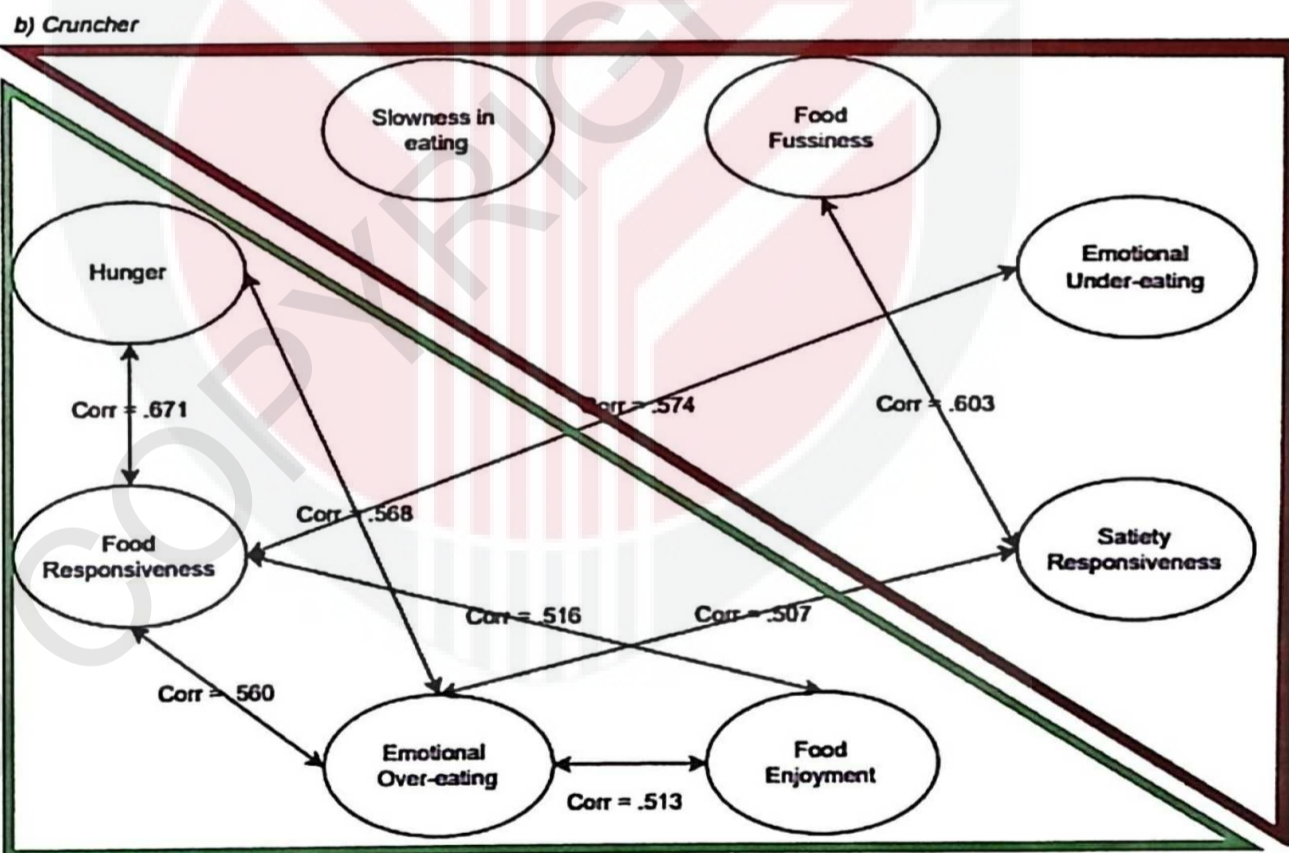


Figure 4-12: PLS-CFA of individual items for Cruncher

c) Smoosher

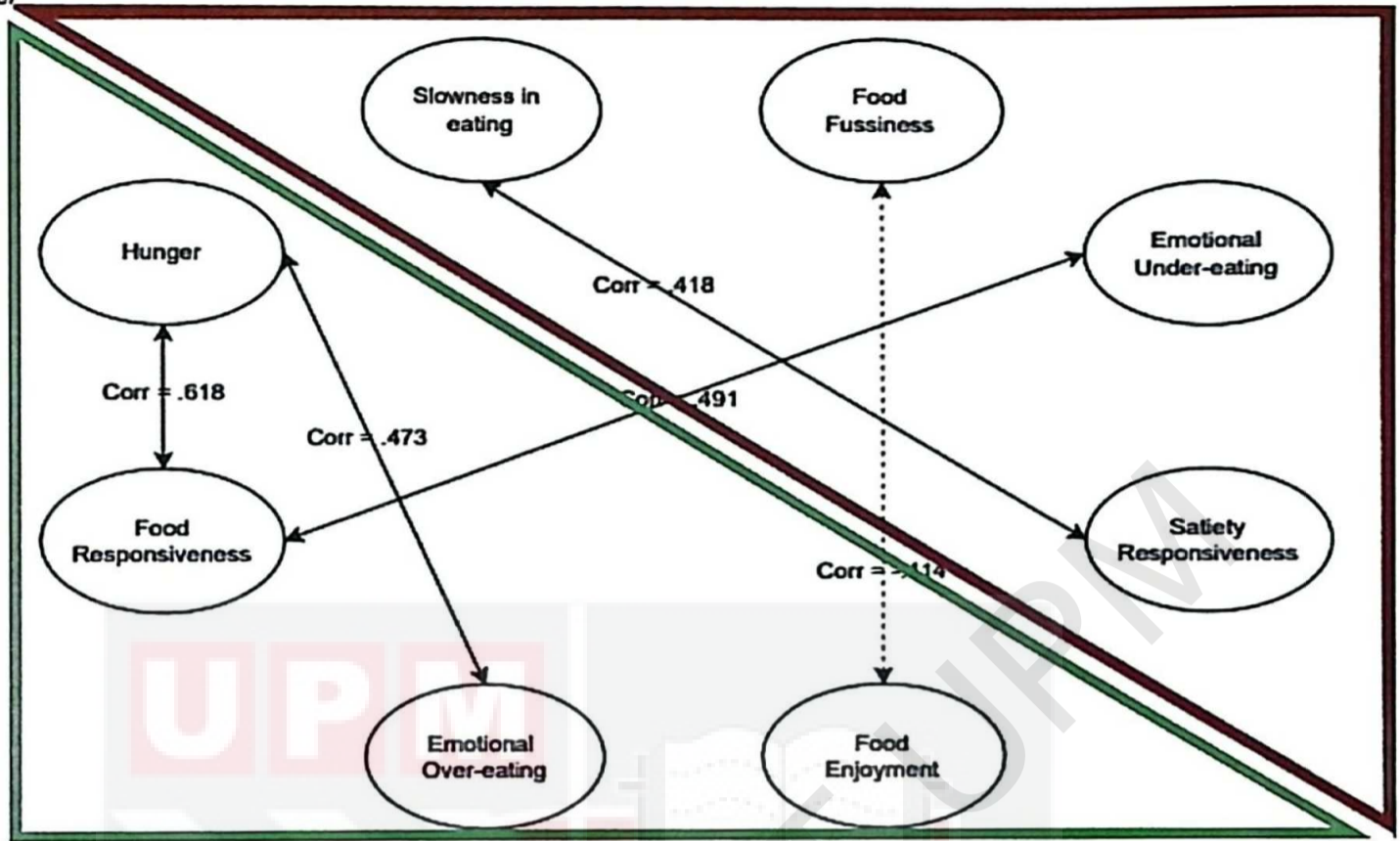


Figure 4-13: PLS-CFA of individual items for Smoosher

d) Sucker

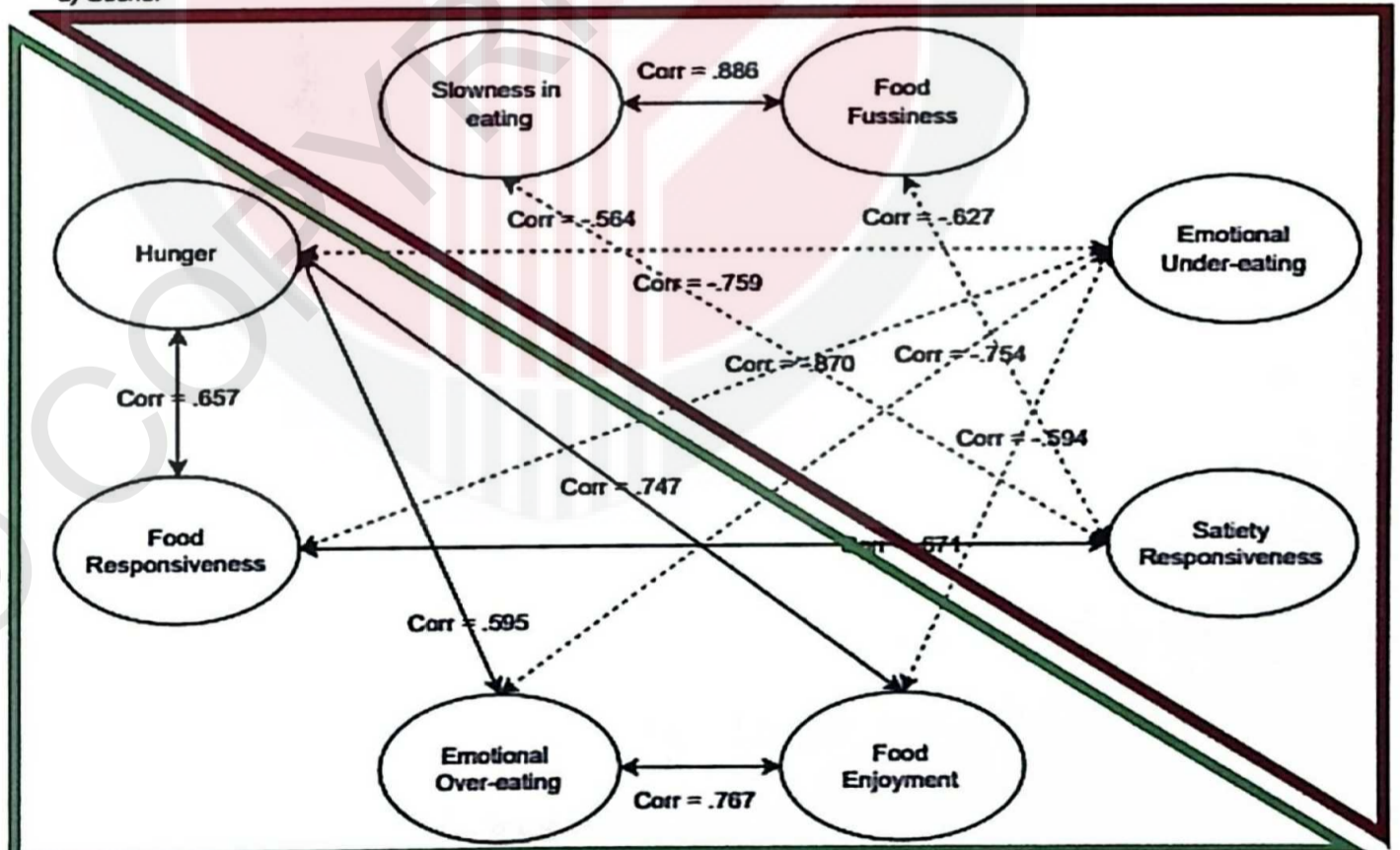


Figure 4-14: PLS-CFA of individual items for Sucker

The figure above illustrates the food approach-avoidance behaviour based on an individual's preferred oral processing behaviour. A bi-directional arrow between approach and avoidance indicates the correlational relationship between the two dimensions, and weighing for each item was measured. Model quality of each PLS-CFA was assessed and deemed reliable and robust based on Cronbach's Alpha and D.G's rho (PCA).

In this segment, all the figures are explained for more specific correlations over the eight dimensions. The green right triangle indicates approach behaviour: Hunger, Food Responsiveness, Emotional Over-eating, and Food Enjoyment. The red right triangle indicates the avoidance behaviour which they all tend to avoid food, for instance, Slowness in eating, Food Fussiness, Emotional Under-eating, and Satiety Responsiveness.

Chewers in Figures 4-11 showed that Food Responsiveness correlates (Corr = .476) with Food Enjoyment while (Corr = .604) with Hunger. There is no correlation between the dimensions of Emotional Over-eating under the food approach. In other hand, Satiety Responsiveness has a correlation with Slowness in eating (Corr = .490) and Food Fussiness (Corr = .444). No correlations showed in Emotional Under-eating dimensions. From both sides, the Emotional-eating showed no interrelationship in these food traits. In this type of mouth behaviour, there are no correlations that came across between two appetitive traits. The correlation only stands in their own dimension's group. This implies that, the urge of eating the foods when they view or taste the meals of individuals will increase their hunger and eventually give an enjoyment when they consume it. Chewers also might be a slowly in eating and picky eater since they have an ability to regulate intake of food in relation to satiety. This is due to an increase in satiety hormones, eating slowly has been demonstrated to reduce the amount of food ingested throughout a meal (Kokkinos, 2010).

Besides, Figure 4-12 Crunchers showed that all of the dimensions in food traits have their connection, excluding Slowness in eating. For Emotional Over-eating, the correlations that connect with it are Hunger (Corr = .568), Food Enjoyment (Corr = .513), and Satiety Responsiveness (Corr = .507). For Food Responsiveness, the correlations are Hunger (Corr = .671), Emotional Under-eating (Corr = .568), Emotional Over-eating (Corr = .560), and Food Enjoyment (Corr = .516). Food Fussiness and Satiety Responsiveness also have reciprocity between (Corr = .603). Crunchers showed there correlate with the two appetitive traits. A cruncher individually will feel hungry and emotional when they see, smell or taste the delicious foods and will enjoy and takes pleasure in eating and drinking when they consume it. However, the hungry and emotional person will tend to overeat when they are stressed and after that will give satiation towards the eating action. Nonetheless, they also could be a picker eater to achieve satiation.

Moreover, for Smooshers in Figure 4-13, Hunger has a connection between Food Responsiveness (Corr = .618) and Emotional Over-eating (Corr = .473). The correlation between Food Responsiveness and Emotional Under eating is 0.491 (Corr = .491), while the other interaction between Slowness in eating and Satiety Responsiveness is 0.418 (Corr = .481). This type of Mouth Behaviour showed a negative correlation between Food Fussiness and Food Enjoyment, which is (Corr = -.414), where they present inversely proportional to each other. Smooshers individually also tend to have a feeling of hunger if they view and smell the foods however they will be eating less meals in response to the negative emotions. In contrast, for two dimensions, Food Enjoyment and Food Fussiness, they showed a negative correlation, which means that if a person enjoyed the food, it would reduce the food selection of the meals. Inversely, if the person does not enjoy the meals, they will tend to be a picky eater.

Another class of Mouth Behaviour which is Sucker in Figure 4-14, has a complex interrelationship, shows many connections, including the director, and is inversely proportional. For Hunger, the dimension has a positive correlation with Food Responsiveness (Corr = .657), Emotional Over-eating (Corr = .595) and Food Enjoyment (Corr = .747) as well as a negative correlation on Emotional Under-eating. Food Responsiveness also has a positive correlation with Satiety Responsiveness (Corr = .671) and a negative correlation with Emotional Under-eating (Corr = -.870). Not only for Food Responsiveness, but Food Enjoyment also correlates with Emotional Over-eating (Corr = .767) and a negative link with Emotional Under-eating with a negative value (Corr = - .594). Regarding food avoidance traits, all four dimensions, including Slowness in eating, Food Fussiness, Emotional Under-eating, and Satiety Responsiveness, have all negative links. For sucker, hunger has a strong correlation with the food responsiveness since when they view or smell the food, they will easily felt hungry and that individually will tend to be emotional when eating along with enjoyed their meals. For those who has the strong restless desire towards food when they view or even smell, they also will have a tendency to regulate intake of food in relation to satiety.

The eating behaviour includes what, when, and how much to consume. Understanding eating behaviour is essential due to the fact that our food choices impact both people and society. Understanding changes in oral processing behaviour amongst consumer groups may bring effective interventions for regulating food intake in vulnerable communities, such as increasing food intake in the elderly or decreasing it in the obese. Although the outcomes of this survey give insight into consumer preferences concerning ethnicity, preferred oral processing, and sensory responsiveness, several limitations must be considered when analyzing the relationship. First, the sample size of the research was relatively small. Although there

were some statistically significant observations, the results cannot be extrapolated to the entire Malaysian population; thus, increasing the number of participants is advised to produce a more reliable and generalizable result. Other variables are other significant characteristics relevant to explaining a preference for a texture that needs consideration in the future study. Various researches have uncovered, for instance, the significance of familiarity in affecting food selection in cross-cultural contexts (Hong et al., 2014, Prescott et al., 1997, Torri et al., 2017, Tu et al., 2010). Further cross-cultural investigations should adequately address the impact of familiarity. Third, in this study, no tongue sensitivity procedures, such as the two-point discrimination task and the stereognosis letter-recognition test, were employed to assess the roughness and the point-and-edge sensitivity, respectively, to encompass size and orientation discrimination. It should be highlighted, however, that the latter technique may not be appropriate for cross-cultural research involving people with highly diverse handwritten scripts (e.g., Tamil vs. Mandarin alphabet characters). Last but not least, perception and acceptability of food texture may be more connected with individual sensitivity to particular key texture features, such as graininess, roughness, and hardness. Therefore, more study is required to examine the relationship between texture perception, acceptability, and the ability to differentiate texture features. A more qualitative methodology, including 'think-aloud' interviews, might have resulted in alternative wording for our final questionnaire. Data collecting through a survey sampling business tends to yield a small sample of persons from similar ethnic and social backgrounds; notwithstanding a diverse range of educational levels, our sample was primarily white. The cross-sectional design of the study limits any causal conclusions.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

In conclusion, this perception substantially enhances our understanding of eating behavior among teenagers and adults in Malaysia. Consumer's actual mouth behaviour, BMI classification, and age affected eating behaviour in terms of Malaysian foodstuffs and impacted their sensory perception. People in Malaysia tended to be heavy chewers, crunchers, and smoothers. Underweight communities tend to stay away from food along with the younger age group was shown to be more and more open to eating foods. However, there was no association between race and gender. These observations in oral processing behaviour might be interesting in future studies to evaluate the parameters, including the oral physiology, anatomy, and nutritional needs of consumer groups among Malaysians.

These findings support the view that approach and avoidance associated with appetitive qualities are systematically and inversely related to obesity, race, gender, age, and mouth behaviour. Early analysis of these qualities could be utilized as susceptibility indicators to predict their mouth preference and eating behaviour

attributes. The survey also is a reliable appliance that measures an adult's appetite in a complete, convenient, and simple way, including the personality measure of appetite attributes in adults. This study will give an insight towards an engineer or entrepreneur in specialized food product development as it provides a structure tool to measure and classify Malaysian individuals in the Preferred Mouth Behaviour framework. These data also might broaden research opportunities in oral processing modelling, targeted product design, and other related applications. In future investigations, all of the physics terminology can be applied to chewing action. For example, the goal is to see if MB groups are associated with the morphological variance in body, head, and oral cavity size and masticatory apparatus performance (i.e., maximum jaw gape, maximum bite forces at the incisors and first molar). They may be able to answer issues presented by Jeltema et al. (2015) on the relationship between Mouth Behavior groups and body metrics, oral cavity measures, and masticatory equipment performance.

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APPENDICES

1) Summary for all Ys

	Hunger	Food Responsive	Emotional Over-eating	Food Enjoyment	Satiety Responsiveness	Emotional Under-eating	Food Fussiness	Slowness in eating	Approach	Avoid
R ²	0.116	0.156	0.189	0.037	0.179	0.076	0.186	0.073	0.114	0.128
F	1.683	2.375	3.007	0.494	2.803	1.055	2.947	1.014	1.651	1.883
Pr > F	0.057	0.004	0.000	0.942	0.001	0.401	0.000	0.442	0.064	0.027
Age	0.883 0.475	3.630 0.007	4.825 0.001	1.029 0.394	0.868 0.484	0.981 0.419	0.887 0.473	0.552 0.698	2.482 0.045	0.453 0.770
Gender	0.100 0.905	0.304 0.738	0.044 0.957	0.100 0.905	0.008 0.992	0.199 0.820	2.281 0.105	0.950 0.389	0.139 0.871	0.167 0.846
Ethnicity	2.460 0.064	0.898 0.443	1.459 0.227	0.142 0.935	1.753 0.158	0.008 0.999	1.962 0.121	0.374 0.772	1.774 0.154	1.164 0.325
BMI classification	1.868 0.136	1.804 0.148	3.115 0.027	0.246 0.864	5.832 0.001	1.468 0.225	2.322 0.076	2.613 0.053	1.142 0.333	3.737 0.012
MB	2.165 0.094	0.643 0.588	4.458 0.005	0.409 0.747	5.099 0.002	0.902 0.441	7.383 0.000	0.477 0.698	0.094 0.964	2.941 0.034

2) Summary LS means for Mouth Behaviour

	Approach					Avoid				
	Hunger	Food Responsive	Emotional Over-eating	Food Enjoyment	Satiety Responsiveness	Emotional Under-eating	Food Fussiness	Slowness in eating	Approach	Avoid
Cruncher	3.021 a	3.279 a	3.069 b	4.358 a	3.284 a	3.402 a	2.930 a	3.163 a	3.432 a	3.195 a
Chewer	3.094 a	3.317 a	3.106 b	4.426 a	3.153 a	3.283 a	2.831 ab	3.006 a	3.486 a	3.068 ab
Smoosher	3.109 a	3.463 a	2.762 c	4.483 a	2.802 b	3.336 a	2.324 b	3.157 a	3.454 a	2.905 b
Sucker	2.135 b	3.431 a	4.091 a	4.293 a	2.396 b	3.898 a	2.296 b	3.080 a	3.487 a	2.918 ab
Pr > F(Model)	0.057	0.004	0.000	0.942	0.001	0.401	0.000	0.442	0.064	0.027
Significant	No	Yes	Yes	No	Yes	No	Yes	No	No	Yes
Pr > F(MB)	0.094	0.588	0.005	0.747	0.002	0.441	0.000	0.698	0.964	0.034
Significant	No	No	Yes	No	Yes	No	Yes	No	No	Yes

3) Summary LS means for Age

	Hunger	Food Responsive	Emotional Over-eating	Food Enjoyment	Satiety Responsiveness	Emotional Under-eating	Food Fussiness	Slowness in eating	Approach	Avoid
26-35	2.928 a	3.333 ab	3.741 a	4.471 a	3.056 a	3.591 a	2.598 a	3.087 a	3.618 ab	3.083 a
56-65	2.991 a	3.310 ab	3.062 ab	4.229 a	3.098 a	3.382 a	2.860 a	3.334 a	3.398 ab	3.168 a
18-25	2.900 a	3.746 a	3.587 a	4.484 a	2.762 a	3.526 a	2.574 a	3.087 a	3.679 a	2.987 a
36-45	2.827 a	3.307 ab	2.647 b	4.554 a	2.783 a	3.684 a	2.284 a	2.840 a	3.334 b	2.898 a
46-55	2.554 a	3.166 b	3.248 a	4.211 a	2.845 a	3.216 a	2.661 a	3.159 a	3.295 b	2.970 a
Pr > F(Model)	0.057	0.004	0.000	0.942	0.001	0.401	0.000	0.442	0.064	0.027
Significant	No	Yes	Yes	No	Yes	No	Yes	No	No	Yes
Pr > F(Age)	0.475	0.007	0.001	0.394	0.484	0.419	0.473	0.698	0.045	0.770
Significant	No	Yes	Yes	No	No	No	No	No	Yes	No

4) Summary LS means for Gender

	Hunger	Food Responsive	Emotional Over-eating	Food Enjoyment	Satiety Responsiveness	Emotional Under-eating	Food Fussiness	Slowness in eating	Approach	Avoid
Others	2.878 a	3.732 a	3.435 a	4.583 a	2.958 a	3.608 a	2.601 ab	3.435 a	3.657 a	3.151 a
Male	2.849 a	3.219 a	3.169 a	4.284 a	2.879 a	3.454 a	2.725 a	2.851 a	3.380 a	2.977 a
Female	2.793 a	3.166 a	3.167 a	4.302 a	2.890 a	3.376 a	2.459 b	3.018 a	3.357 a	2.936 a
Pr > F(Model)	0.057	0.004	0.000	0.942	0.001	0.401	0.000	0.442	0.064	0.027
Significant	No	Yes	Yes	No	Yes	No	Yes	No	No	Yes
Pr > F(Gender)	0.905	0.738	0.957	0.905	0.992	0.820	0.105	0.389	0.871	0.846
Significant	No	No	No	No	No	No	No	No	No	No

5) Summary LS means for Ethnicity

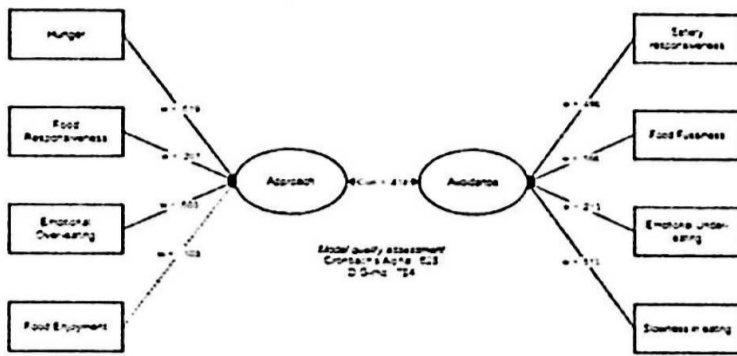
	Hunger	Food Responsive	Emotional Over-eating	Food Enjoyment	Satiety Responsiveness	Emotional Under-eating	Food Fussiness	Slowness in eating	Approach	Avoid
Malays	3.241 a	3.591 a	3.610 a	4.476 a	3.209 a	3.457 a	2.772 a	3.109 a	3.730 a	3.137 a
Others	2.825 ab	3.331 a	2.837 a	4.341 a	2.940 a	3.482 a	3.084 a	3.442 a	3.333 a	3.237 a
Chinese	2.845 ab	3.241 a	3.397 a	4.408 a	2.712 a	3.476 a	2.326 a	3.001 a	3.473 a	2.879 a
Indians	2.450 b	3.326 a	3.185 a	4.334 a	2.774 a	3.504 a	2.199 a	2.853 a	3.324 a	2.833 a
Pr > F(Model)	0.057	0.004	0.000	0.942	0.001	0.401	0.000	0.442	0.064	0.027
Significant	No	Yes	Yes	No	Yes	No	Yes	No	No	Yes
Pr > F(Ethnicity)	0.064	0.443	0.227	0.935	0.158	0.999	0.121	0.772	0.154	0.325
Significant	No	No	No	No	No	No	No	No	No	No

6) Summary LS means for BMI classifications

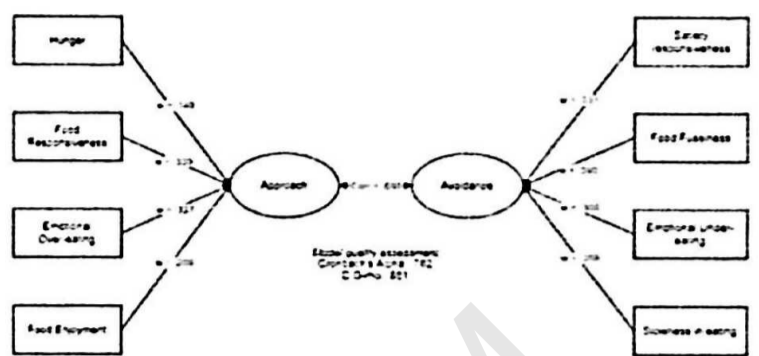
	Approach					Avoid				
	Hunger	Food Responsive	Emotional Over-eating	Food Enjoyment	Satiety Responsiveness	Emotional Under-eating	Food Fussiness	Slowness in eating	Approach	Avoid
Underweight	3.110 a	3.673 a	3.183 ab	4.446 a	3.472 a	3.449 a	2.920 a	3.481 a	3.603 a	3.331 a
Normal	2.891 ab	3.305 ab	2.972 b	4.338 a	2.878 b	3.661 a	2.480 b	3.111 ab	3.377 a	3.033 b
Obese	2.536 b	3.273 b	3.407 a	4.421 a	2.656 b	3.481 a	2.513 ab	2.777 b	3.409 a	2.857 b
Overweight	2.823 ab	3.238 b	3.466 a	4.354 a	2.628 b	3.327 a	2.468 b	3.037 b	3.470 a	2.865 b
Pr > F(Model)	0.057	0.004	0.000	0.942	0.001	0.401	0.000	0.442	0.064	0.027
Significant	No	Yes	Yes	No	Yes	No	Yes	No	No	Yes
Pr > F(BMI classifici:	0.136	0.148	0.027	0.864	0.001	0.225	0.076	0.053	0.333	0.012
Significant	No	No	Yes	No	Yes	No	No	No	No	Yes

7) PLS-CFA of four oral processing behaviour

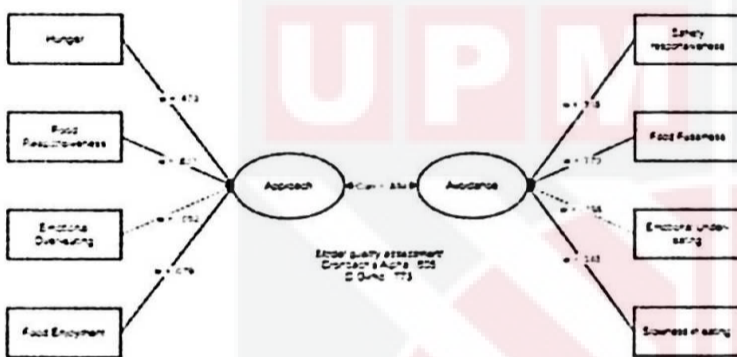
a) Chewer



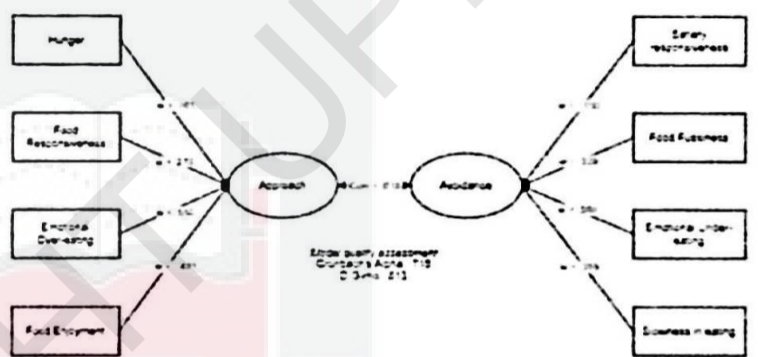
b) Cruncher



c) Smoother

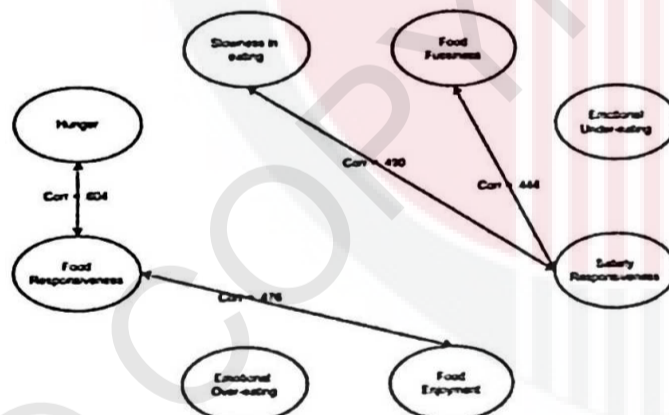


d) Sucker

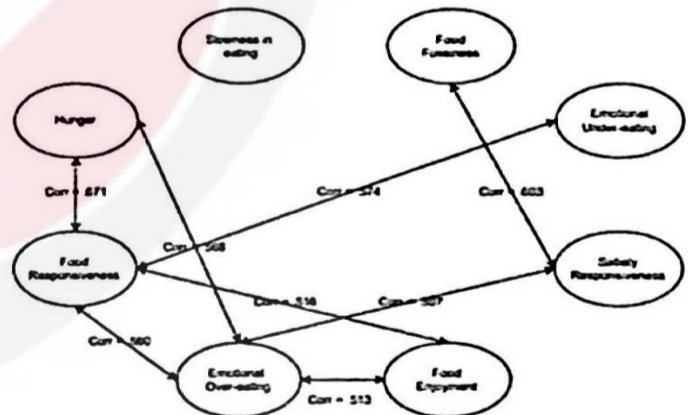


8) PLS-CFA of individual items of food approach-avoidance behaviour

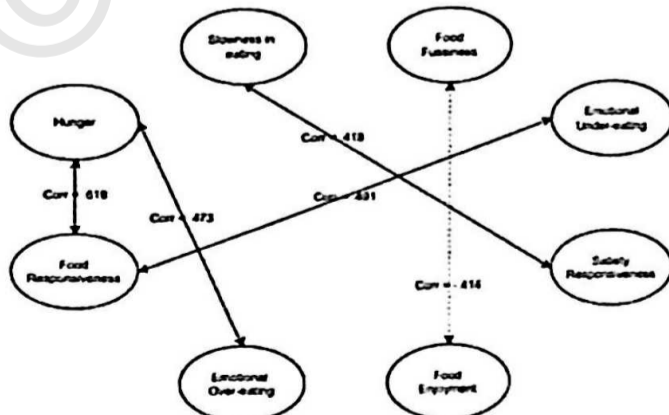
a) Chewer



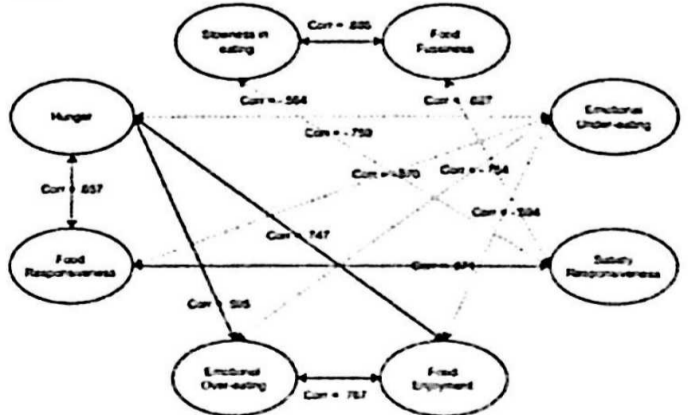
b) Cruncher



c) Smoother



d) Sucker



9) QUESTIONNAIRE FORM IN BILINGUAL (MALAY AND ENGLISH)



Investigating Malaysians' Preferred Mouth Behaviour and its relationship to their Eating Behaviour.

INTRODUCTION:

As food and the culture of eating of the Malaysian urban society has undergone some form of transformation. Understanding the relationship between Malaysian preferred mouth behaviour with their eating behaviour is significant as recognizing consumers' choice of food product, as well as acknowledge the impact of eating behaviour. Limited research on Malaysia is available since a lot of research on food preference and eating behaviour focuses on European and American country. Therefore, this research takes a closer look at the pattern of the Malaysian culture's food preference with a linkage of their eating behaviour. This research study focuses on the eating behaviour of Malaysian consumer's cultural backgrounds on their sensory perception and acceptability when evaluating food items.

PURPOSE:

The research aims to explore the relationship between Malaysian preferred mouth behaviour and their eating behaviour. It is basically how the attitudes and psychosocial factors related to the selection and decision of which foods to eat.

STUDY PROCEDURE:

This project involves four sections. First section will be asked for demographic inquiry especially on weight and height as these measurements are used to calculate the body mass index, or BMI. Second and third section will be asked for their apprehension and understanding about the classification of food. Fourth section is regarding the eating behaviour of the participants. All participants above 18 are invited via social media to complete the online questionnaire voluntarily.

SURVEY COMPONENT:

The survey consists of online questionnaires, which usually takes less than 20 minutes to complete. The questionnaires ask about your experience and knowledge regarding the class of foods, preference of taste, and your perspective and behaviour towards food. You will also be asked for some demographic details (e.g. age, gender, race, etc.)

PARTICIPATION IN THIS STUDY:

Participation in this research is entirely voluntary. Whether or not you decide to participate, your decision will not disadvantage you in any way. Only people who give their informed consent will be included in the project. If you provide informed consent to participate, you may still withdraw from the project at any time without giving a reason. You also have the option of withdrawing any data that may identify you.

BENEFIT TO THE PARTICIPANTS:

There are no direct benefits to you for participating in this study. This study will benefits to researcher in order to acknowledge the preference of food among Malaysian people and their behaviour to the food products.

RISKS TO THE PARTICIPANTS:

There is no risk or any danger in participating this questionnaire but if you feel offended by the questions you are free to either withdraw from the project or stop and return to it some other time. Participation in this research is entirely voluntary and anonymous, you may withdraw your participation and any identifiable data at any time, without prejudice.

CONFIDENTIALITY:

Your answer and information will be kept confidential by the investigators and will not be made public.

If you have any questions about this study or your rights, do not hesitate to contact:

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Email: alifdalino@upm.edu.my.

*** Required**

1. By clicking "I agree" below you are indicating that you are at least 18 years old, have read and understood this consent form and agree to participate in this research study.

Mark only one oval.

I agree with the statement above

Demographic Section

2. Age *

Mark only one oval.

- 18-25
- 26-35
- 36-45
- 46-55
- 56-65
- Above 65

3. Gender (Sex that assigned at birth) *

Mark only one oval.

- Female
- Male
- Others

4. Ethnicity *

Mark only one oval.

- Malays
- Chinese
- Indians
- Orang Asli
- Other:

5. Weight (kg) *

6. Height (cm) *

Crunchy = A dense-texture foods when chewed with the molars, it undergoes a series of fractures while emitting relatively loud, low pitched sounds. Food that is crunchy is pleasantly hard or crisp so that it makes a noise when you eat it.

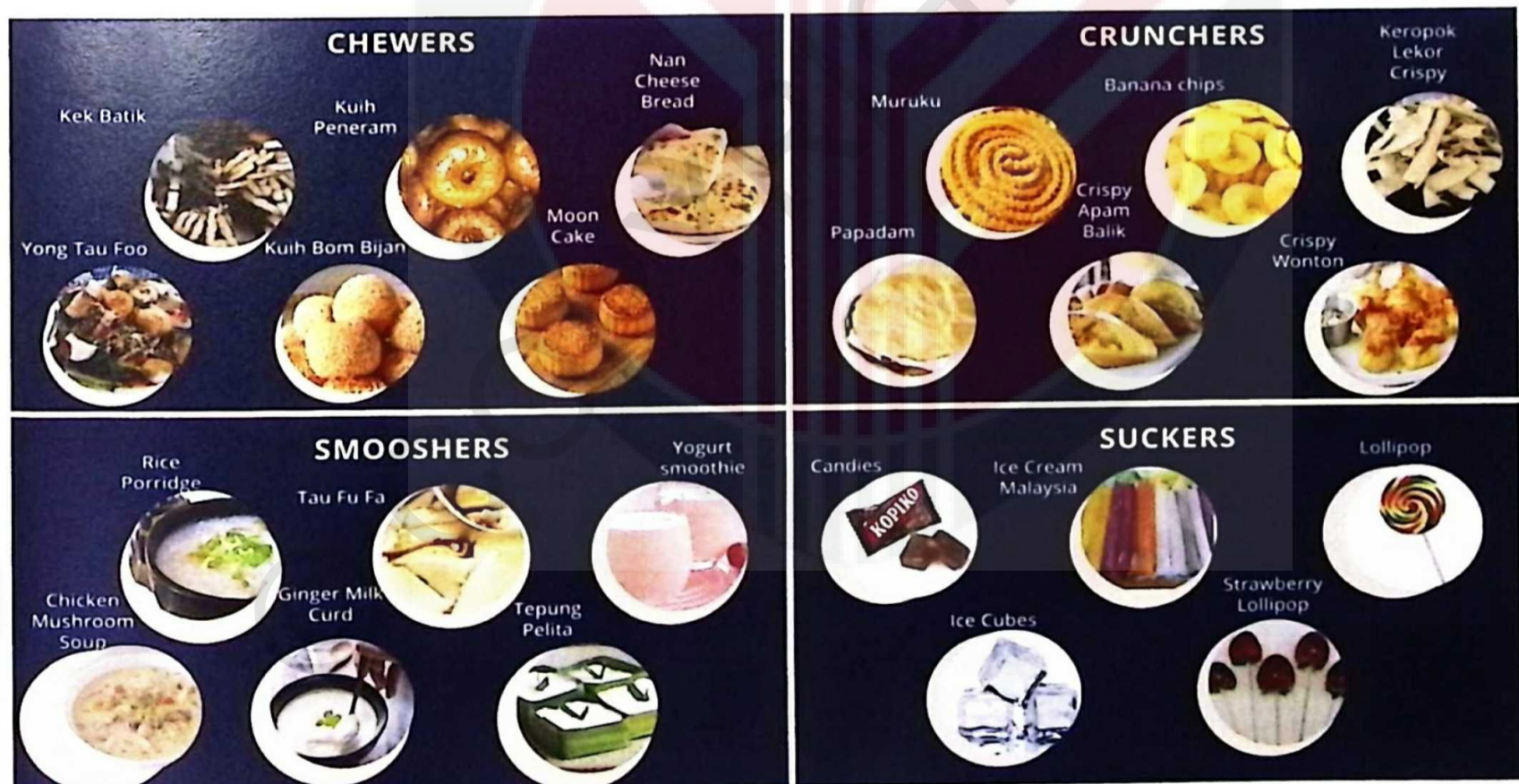
Chewy = A food that need to be crushed a lot with the teeth before it becomes soft enough to swallow due to sustained, elastic resistance from the food. It not easily chewed, as because of toughness or stickiness and requiring much chewing.

Smooshy = Foods that required a minimal amount of chewing. Foods that are soft and easy to swallow. These foods may be chopped, smashed, ground, pureed, and moist. It is basically made up of foods that are easy to digest. Such as mashed potato.

Sucky = Foods that we can draw into the mouth by producing partial vacuum by action of the lips and tongue.

Food Classification Section

Overall, how do u classify yourself based on these following food examples.



7. Have you ever tried rice porridge before? Which class that you will classify this food as? *



Mark only one oval.

- Crunchy
- Chewy
- Smooshy
- Sucky
- Haven't tried yet

8. Have you ever tried putu piring before? Which class that you will classify this food as? *



Mark only one oval.

- Crunchy
- Chewy
- Smooshy
- Sucky
- Haven't tried yet

9. Have you ever tried banana chips before? Which class that you will classify this *
food as?



Mark only one oval.

- Crunchy
- Chewy
- Smooshy
- Sucky
- Haven't tried yet

10. Have you ever tried lollipop before? Which class that you will classify this food * as?

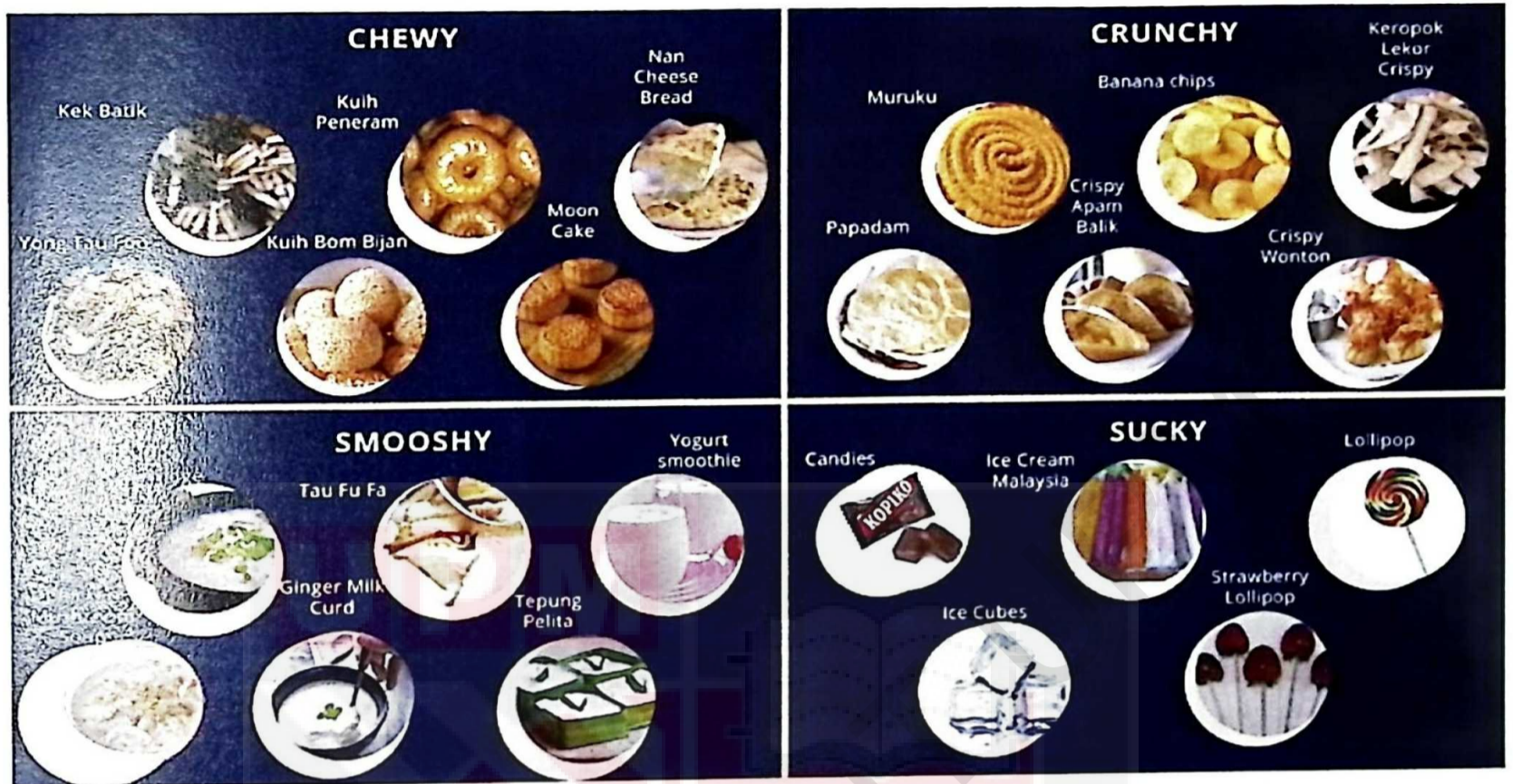


Mark only one oval.

- Crunchy
- Chewy
- Smooshy
- Sucky
- Haven't tried yet

Mouth Behaviour Section

11. Overall, how do you like the texture of the food? What is the texture of the food that you like? *



Mark only one oval.

- Crunchy
- Chewy
- Smooshy
- Sucky

12. 1) Do you prefer products that you can chew? *

Mark only one oval.

- Yes
- No

13. 2) Do you prefer hard crunchy biscuits over soft chewy cookies? *

Mark only one oval.

- Yes
- No

14. 3) Do you prefer hard granola bars over soft chewy bars? *

Mark only one oval.

Yes

No

15. 4) Do you prefer hard candy over soft candy? *

Mark only one oval.

Yes

No

16. 5) Do you like to suck on candy for a long time? *

Mark only one oval.

Yes

No

17. 6) If you have breakfast cereals with milk, do you let the cereal go soft before you eat it? *

Mark only one oval.

Yes

No

18. 7) Do you like foods that are soft and spread through the mouth? *

Mark only one oval.

Yes

No

19. 8) Do you prefer ice cream with no pieces? (etc chips, nuts) *

Mark only one oval.

Yes

No

20. 9) Do you like to eat ice cream as soon as it is out of the freezer? *

Mark only one oval.

Yes

No

Eating Behaviour
Section

Please read each statement and tick the box most appropriate to you.

1 - Strongly Disagree

2 - Disagree

3 - Not sure either Agree or Disagree

4 - Agree

5 - Strongly Agree

21. 1) I love food. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree

Strongly Agree

22. 2) I often decide that I don't like a food, before tasting it. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree

Strongly Agree

23. 3) I enjoy eating. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

24. 4) I look forward to mealtimes. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

25. 5) I eat more when I'm annoyed. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

26. 6) I often notice my stomach rumbling. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

27. 7) I refuse new foods at first. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

28. 8) I eat more when I'm worried. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

29. 9) If I miss a meal, I get irritable. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

30. 10) I eat more when I'm upset. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

31. 11) I often leave food on my plate at the end of a meal. *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

32. 12) I enjoy tasting new foods. *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

33. 13) I often feel hungry when I am with someone who is eating. *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

34. 14) I often finish my meals quickly. *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

35. 15) I eat less when I'm worried. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

36. 16) I eat more when I'm anxious. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

37. 17) Given the choice, I would eat most of the time. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

38. 18) I eat more when I'm happy. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

39. 19) I am interested in tasting new food I haven't tasted before. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

40. 20) I eat less when I'm upset. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

41. 21) I eat more when I'm angry. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

42. 22) I am always thinking about food. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

43. 23) I often get full before my meal is finished. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

44. 24) I enjoy a wide variety of foods. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

45. 25) I am often last at finishing a meal. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

46. 26) I eat more and more slowly during the course of a meal. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

47. 27) I eat less when I'm annoyed. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

48. 28) I often feel so hungry that I have to eat something right away. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

49. 29) I eat slowly. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

50. 30) I cannot eat a meal if I have had a snack just before. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

51. 31) I get full up easily. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

52. 32) I often feel hungry. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

53. 33) When I see or smell food that I like, it makes me want to eat. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

54. 34) If my meals are delayed I get headache. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

55. 35) I eat less when I'm anxious. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

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Google Forms



Kajian mengenai hubungan antara citarasa pengguna dan tabiat makan dalam kalangan rakyat Malaysia.

PENGENALAN:

Memandangkan makanan dan budaya makan masyarakat bandar Malaysia telah mengalami beberapa bentuk transformasi. Memahami hubungan antara tingkah laku mulut oleh rakyat Malaysia dengan tingkah laku pemakanan mereka adalah penting sebagai mengiktiraf pilihan produk makanan pengguna, serta mengakui kesan tingkah laku makan. Penyelidikan terhad di Malaysia tersedia memandangkan banyak penyelidikan mengenai keutamaan makanan dan tingkah laku makan tertumpu kepada negara Eropah dan Amerika. Oleh itu, kajian ini melihat dengan lebih dekat corak kegemaran makanan budaya Malaysia dengan kaitan tingkah laku pemakanan mereka. Kajian penyelidikan ini memberi tumpuan kepada tingkah laku pemakanan latar belakang budaya pengguna Malaysia terhadap persepsi deria dan penerimaan mereka semasa menilai bahan makanan.

TUJUAN:

Penyelidikan ini bertujuan untuk mengkaji hubungan antara citarasa pengguna dalam kalangan komuniti di Malaysia dan tingkah laku atau tabiat makan mereka. Ia berkaitan mengenai bagaimana sikap dan faktor psikososial berkait dengan pemilihan dan keputusan makanan yang hendak dimakan.

PROSEDUR KAJIAN:

Projek ini melibatkan empat bahagian. Bahagian pertama akan diminta untuk pertanyaan demografi terutamanya mengenai berat dan ketinggian kerana ukuran ini digunakan untuk mengira indeks jisim badan, atau BMI. Bahagian kedua dan ketiga akan ditanya tentang kefahaman mereka tentang kelas makanan. Bahagian keempat adalah mengenai tingkah laku makan peserta. Semua peserta 18 ke atas dijemput melalui media sosial untuk melengkapkan soal selidik dalam talian secara sukarela.

KOMPONEN BORANG SOAL SELIDIK:

Tinjauan ini terdiri daripada soal selidik dalam talian, yang biasanya mengambil masa kurang daripada 20 minit untuk disiapkan. Soal selidik bertanya tentang pengalaman dan pengetahuan anda mengenai kelas makanan, keutamaan rasa, dan perspektif dan tingkah laku anda terhadap makanan. Anda juga akan diminta untuk beberapa butiran demografi (spt umur, jantina, bangsa, dll.)

PENYERTAAN DALAM KAJIAN:

Penyertaan dalam penyelidikan ini adalah secara sukarela. Sama ada anda memutuskan untuk mengambil bahagian atau tidak, keputusan anda tidak akan merugikan anda dalam apa jua cara. Hanya orang yang memberikan persetujuan termaklum mereka akan dimasukkan ke dalam projek. Jika anda memberikan persetujuan termaklum untuk mengambil bahagian, anda masih boleh menarik diri daripada projek pada bila-bila masa tanpa memberi sebab. Anda juga mempunyai pilihan untuk menarik balik sebarang data yang mungkin mengenal pasti anda.

FAEDAH KEPADA PESERTA:

Tiada faedah secara langsung kepada anda untuk menyertai kajian ini. Kajian ini hanya akan memberi manfaat kepada pengkaji untuk mengetahui keutamaan makanan dalam kalangan rakyat Malaysia dan tingkah laku mereka terhadap produk makanan tersebut.

RISIKO KEPADA PESERTA:

Tiada risiko atau apa-apa bahaya dalam menyertai soal selidik ini tetapi jika anda berasa tersinggung dengan soalan tersebut anda bebas untuk menarik diri daripada projek itu atau berhenti dan kembali kepadanya pada masa lain. Penyertaan dalam penyelidikan ini adalah secara sukarela dan tanpa nama, anda boleh menarik balik penyertaan anda dan sebarang data yang boleh dikenal pasti pada bila-bila masa, tanpa prejudis.

KERAHSIAAN:

Jawapan dan maklumat anda akan dirahsiakan oleh penyelidik dan tidak akan didedahkan kepada umum.

Jika anda mempunyai sebarang soalan tentang kajian ini atau hak anda, jangan teragak-agak untuk menghubungi:

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*** Required**

1. Dengan menandakan "Saya bersetuju" di bawah, anda menunjukkan bahawa anda berumur sekurang-kurangnya 18 tahun, telah membaca dan memahami borang persetujuan ini, serta bersetuju untuk mengambil bahagian dalam kajian penyelidikan ini. *

Mark only one oval.

Saya bersetuju dengan pernyataan di atas

Bahagian 1: Maklumat Demografik

2. Umur *

Mark only one oval.

- 18-25
 26-35
 36-45
 46-55
 56-65
 65 ke atas

3. Jantina *

Mark only one oval.

- Perempuan
 Lelaki

4. Bangsa *

Mark only one oval.

- Melayu
 Cina
 India
 Orang Asli
 Other: _____

5. Berat (kg) *

6. Tinggi (cm) *

Bahagian
2:
Pengelasan
Makanan

Rangup (Crunchy) = Makanan bertekstur padat apabila dikunyah dengan gigi geraham, ia mengalami beberapa siri patah tulang sambil mengeluarkan bunyi yang agak kuat dan nada rendah. Makanan yang rangup adalah keras atau garing sehingga mengeluarkan bunyi apabila anda memakannya.

Kenyal (Chewy) = Makanan yang perlu dihancurkan banyak dengan gigi sebelum ia menjadi cukup lembut untuk ditelan kerana rintangan kenyal yang berterusan daripada makanan. Ia tidak mudah dikunyah, kerana keliatan atau melekit dan memerlukan banyak kunyah.

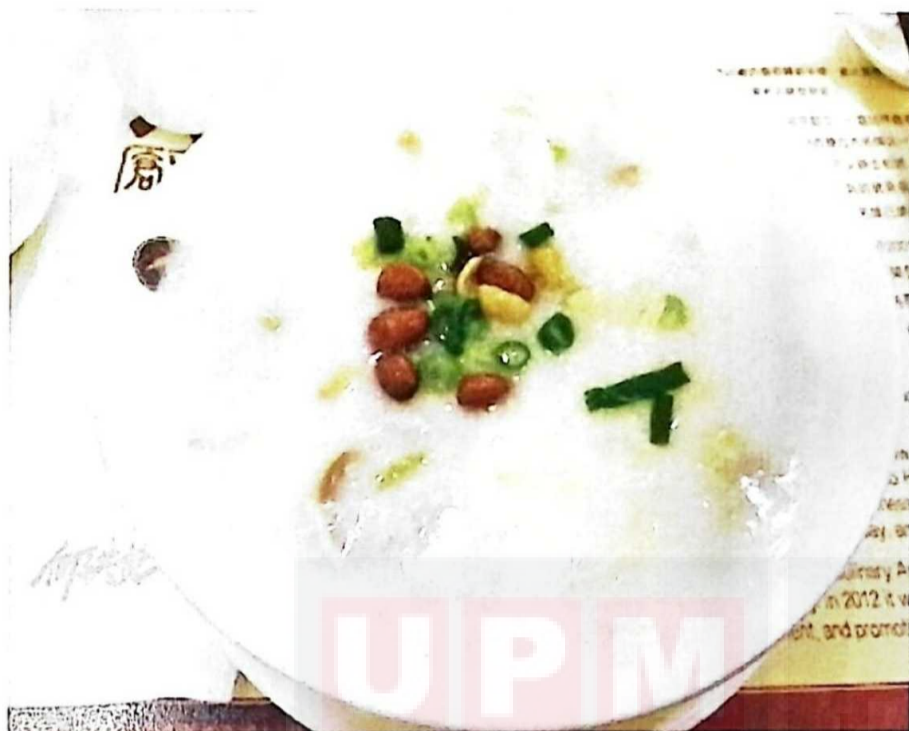
Smooshy = Makanan yang memerlukan sedikit kunyahan. Makanan yang lembut dan mudah ditelan. Makanan ini boleh dicincang, dihancurkan, dikisar, ditulen dan dibasahi. Ia pada asasnya terdiri daripada makanan yang mudah dihadam. Seperti kentang tumbuk.

Sucky = Makanan yang boleh kita masukkan ke dalam mulut dengan menghasilkan separa vakum melalui tindakan bibir dan lidah.

Secara keseluruhan, bagaimana anda mengklasifikasikan diri anda berdasarkan contoh makanan berikut.



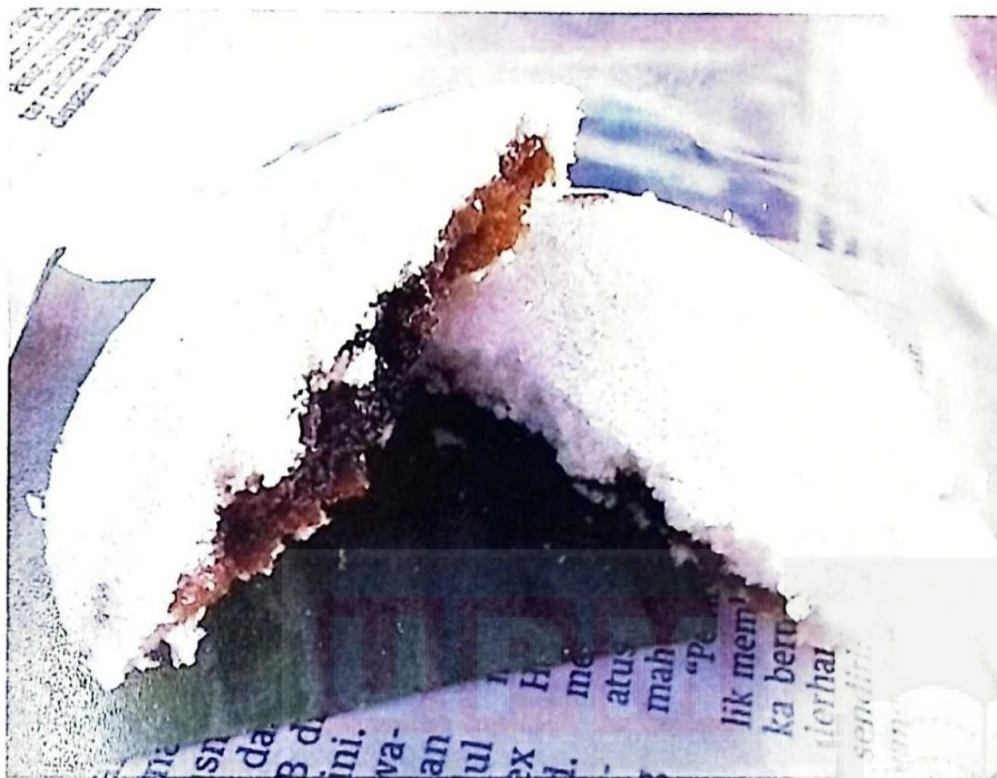
7. Adakah anda pernah mencuba bubur nasi sebelum ini? Apakah klasifikasi makanan ini? *



Mark only one oval.

- Crunchy (Rangup)
- Chewy (Kenyal)
- Smooshy
- Sucky
- Option 5

8. Adakah anda pernah mencuba putu piring sebelum ini? Apakah klasifikasi makanan ini? *



Mark only one oval.

- Crunchy (Rangup)
- Chewy (Kenyal)
- Smooshy
- Sucky
- Belum cuba lagi

9. Adakah anda pernah mencuba kerepek pisang sebelum ini? Apakah klasifikasi *
makanan ini?



Mark only one oval.

- Crunchy (Rangup)
- Chewy (Kenyal)
- Smooshy
- Sucky
- Belum cuba lagi

10. Adakah anda pernah mencuba lolipop sebelum ini? Apakah klasifikasi makanan * ini?



Mark only one oval.

- Crunchy (Rangup)
- Chewy (Kenyal)
- Smooshy
- Sucky
- Belum cuba lagi

Bahagian 3: Citarasa Makanan

11. Secara keseluruhan, bagaimanakah citarasa anda terhadap jenis tekstur makanan. *
Apakah tekstur makanan yang anda sukai?



Mark only one oval.

- Crunchy
 Chewy
 Sucky
 Smoosy

12. 1) Adakah anda lebih suka produk yang anda boleh kunyah? *

Mark only one oval.

- Ya
 Tidak

13. 2) Adakah anda lebih suka biskut keras rangup berbanding biskut kenyal lembut? *

Mark only one oval.

- Ya
 Tidak

14. 3) Adakah anda lebih suka bar granola keras berbanding bar kenyal lembut? *

Mark only one oval.

Ya

Tidak

15. 4) Adakah anda lebih suka gula-gula keras berbanding gula-gula lembut? *

Mark only one oval.

Ya

Tidak

16. 5) Adakah anda suka menghisap gula-gula untuk masa yang lama? *

Mark only one oval.

Ya

Tidak

17. 6) Jika anda mempunyai bijirin sarapan pagi dengan susu, adakah anda membiarkan bijirin menjadi lembut sebelum anda memakannya? *

Mark only one oval.

Ya

Tidak

18. 7) Adakah anda suka makanan yang lembut dan tersebar melalui mulut? *

Mark only one oval.

Ya

Tidak

19. 8) Adakah anda lebih suka aiskrim tanpa kepingan? (spt kekacang atau cip coklat) *

Mark only one oval.

- Ya
 Tidak

20. 9) Adakah anda suka makan aiskrim sebaik sahaja ia keluar dari peti sejuk? *

Mark only one oval.

- Ya
 Tidak

Bahagian 4: Tabiat
Ketika Makan

Sila baca setiap pernyataan dan tandakan pada kotak yang paling sesuai untuk anda

- 1 - Sangat Tidak Setuju
2 - Tidak Setuju
3 - Tidak pasti Setuju atau Tidak Setuju
4 - Setuju
5 - Sangat Setuju

21. 1) Saya suka makanan. *

Mark only one oval.

1 2 3 4 5

Sangat Tidak Setuju Sangat Setuju

22. 2) Saya sering membuat keputusan bahawa saya tidak akan suka makanan itu * selagi belum menjamahnya.

Mark only one oval.

1 2 3 4 5

Sangat Tidak Setuju Sangat Setuju

23. 3) Saya seronok apabila makan. *

Mark only one oval.

1 2 3 4 5

Sangat Tidak Setuju Sangat Setuju

24. 4) Saya menantikan waktu makan. *

Mark only one oval.

1 2 3 4 5

Sangat Tidak Setuju Sangat Setuju

25. 5) Saya makan lebih banyak apabila saya rasa menjengkelkan. *

Mark only one oval.

1 2 3 4 5

Sangat Tidak Setuju Sangat Setuju

26. 6) Saya sering perasan perut saya berbunyi. *

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat Setuju

27. 7) Saya menolak makanan baru pada mulanya. *

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat Setuju

28. 8) Saya makan lebih banyak apabila saya bimbang. *

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat Setuju

29. 9) Jika saya terlepas makan, saya akan meragam. *

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat Setuju

30. 10) Saya makan lebih banyak apabila saya rasa kecewa. *

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat Setuju

31. 11) Saya sering meninggalkan makanan di atas pinggan saya semasa akhir makan. *

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat Setuju

32. 12) Saya teruja merasa makanan baru. *

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat Setuju

33. 13) Saya sering berasa lapar apabila saya bersama seseorang yang sedang makan. *

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat Setuju

34. 14) Saya sering menghabiskan makanan saya dengan cepat. *

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat Setuju

35. 15) Saya kurang makan apabila saya bimbang. *

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat Setuju

36. 16) Saya makan lebih banyak apabila saya cemas. *

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat Setuju

37. 17) Jika diberi pilihan, saya akan makan pada setiap masa. *

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat Setuju

38. 18) Saya makan lebih banyak apabila saya bahagia. *

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat Setuju

39. 19) Saya berminat untuk merasa makanan baru yang belum pernah saya rasai. *

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat Setuju

40. 20) Saya kurang makan apabila saya kecewa. *

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat Setuju

41. 21) Saya makan lebih banyak apabila saya marah. *

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat Setuju

42. 22) Saya sentiasa berfikir tentang makanan. *

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat Setuju

43. 23) Saya sering kenyang sebelum makanan saya habis. *

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat Setuju

44. 24) Saya menikmati pelbagai jenis makanan. *

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat Setuju

45. 25) Saya sering kali menjadi orang terakhir menghabiskan makanan. *

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat Setuju

46. 26) Saya makan lebih perlahan semasa makan. *

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat Setuju

47. 27) Saya kurang makan apabila saya marah. *

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat Setuju

48. 28) Saya sering berasa sangat lapar sehingga saya perlu makan sesuatu dengan segera. *

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat Setuju

49. 29) Saya makan perlahan-lahan. *

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat Setuju

50. 30) Saya tidak boleh makan jika saya sudah makan snek sebelum nya. *

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat Setuju

51. 31) Saya mudah kenyang. *

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat Setuju

52. 32) Saya sering berasa lapar. *

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat Setuju

53. 33) Apabila saya melihat atau menghidu makanan yang saya suka, ia *
membuatkan saya ingin makan.

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat Setuju

54. 34) Jika makan saya ditangguhkan, saya menjadi pening. *

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat Setuju

55. 35) Saya kurang makan apabila saya cemas. *

Mark only one oval.

	1	2	3	4	5	
Sangat Tidak Setuju	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sangat setuju

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