

**INVESTIGATING INTRAPERSONAL,  
INTERPERSONAL FACTORS AND CORRELATED  
OUTCOMES ASSOCIATED WITH PICKY EATING  
BEHAVIOUR AMONG NUTRITION AND DIETETICS  
UNDERGRADUATE STUDENTS  
AT UNIVERSITI SAINS MALAYSIA  
HEALTH CAMPUS**

**NG XUE JUN**

**SCHOOL OF HEALTH SCIENCES  
UNIVERSITI SAINS MALAYSIA**

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HEALTH CAMPUS**

**by**

**NG XUE JUN**

**Dissertation submitted in partial fulfilment  
of the requirements for the degree  
of Bachelor in Nutrition with Honours**

**January 2025**

## CERTIFICATE

This is to certify that the dissertation entitled “Investigating Intapersonal, Interpersonal factors and Correlated Outcomes Associated with Picky Eating Behaviour among Nutrition and Dietetics Undergraduates Student at Universiti Sains Malaysia Health Campus” is the bona fide record of research work done by Ms Ng Xue Jun during the period from March 2024 to January 2025 under my supervision. I have read this dissertation and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation to be submitted in partial fulfillment for the degree of Bachelor in Nutrition with Honours.

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## DECLARATION

I hereby declare that this dissertation is the result of my own investigations, except where otherwise stated and duly acknowledged. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at Universiti Sains Malaysia or other institutions. I grant Universiti Sains Malaysia the right to use the dissertation for teaching, research and promotional purposes.

*Jun*

.....

Ng Xue Jun

Date: 3 March 2025  
.....

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**MENYIASAT FAKTOR INTRAPERSONAL, INTERPERSONAL DAN  
HASIL BERKAITAN YANG DIHUBUNGKAN DENGAN TINGKAH LAKU  
MEMILIH MAKANAN DALAM KALANGAN PELAJAR SARJANA  
MUDA PEMAKANAN DAN DIETETIK DI KAMPUS KESIHATAN  
UNIVERSITI SAINS MALAYSIA**

**ABSTRAK**

Bukti menunjukkan bahawa pemilihan makanan wujud dalam kalangan pelajar sarjana muda di Malaysia dan mungkin dikaitkan dengan masalah mental dan kekurangan pemakanan. Kajian ini dijalankan untuk menyiasat faktor intrapersonal (sensitiviti jijik), faktor interpersonal (tekanan ibu bapa untuk makan dan galakan untuk makan), serta hasil berkaitan (tekanan psikologi dan indeks jisim badan) yang dikaitkan dengan tingkah laku memilih makanan dalam kalangan pelajar sarjana muda pemakanan dan dietetik di Kampus Kesihatan Universiti Sains Malaysia. Sebanyak 167 pelajar tahun satu hingga tahun empat dalam bidang pemakanan dan dietetik berumur  $21.19 \pm 1.44$  tahun (10.2% lelaki dan 89.8% perempuan) telah mengambil bahagian dalam kajian ini. Skor purata pemilihan makanan adalah  $2.52 \pm 0.62$ . Antara proposi pelajar yang tidak mempunyai masalah pemilihan makanan, sederhana dalam masalah pemilihan makanan, dan ekstrim dalam masalah pemilihan makanan masing-masing ialah 23.4%, 52.7% dan 24.0%. Skor

purata untuk kepekaan jijik, tekanan ibu bapa untuk makan, dan galakan ibu bapa untuk makan adalah  $9.54 \pm 1.60$ ,  $3.33 \pm 0.90$ , dan  $4.20 \pm 0.65$ . Bagi tekanan psikologi, ia mempunyai skor purata  $20.62 \pm 7.12$ , di mana 25.7% pelajar didapati mempunyai tahap tekanan psikologi yang ringan, 10.2% dalam tahap sederhana, dan 13.2% dalam tahap serius. BMI purata adalah  $21.41 \pm 3.10$  kg/m<sup>2</sup>. Kadar kekurangan berat badan adalah 15%, manakala untuk kategori berat badan berlebihan, obes kelas I dan kelas II adalah 7.2%, 0.6%, dan 0.6%. Kepekaan jijik secara signifikan meramalkan tingkah laku memilih makanan (Beta = 0.218, R = 0.264, R<sup>2</sup> = 0.070; F (2, 164) = 6.145, p = 0.003). Pemilihan makanan juga dikaitkan secara positif dengan tekanan psikologi (Beta = 0.312, 95% CI: 1.905, 5.259, p < 0.001). Begitu juga, kajian ini menunjukkan hubungan positif yang signifikan antara tingkah laku memilih makanan dan indeks jisim badan (Beta = 0.169, 95% CI: 0.087, 1.604, p = 0.029).

**INVESTIGATING INTRAPERSONAL, INTERPERSONAL FACTORS  
AND CORRELATED OUTCOMES ASSOCIATED WITH PICKY EATING  
BEHAVIOUR AMONG NUTRITION AND DIETETIC UNDERGRADUATE  
STUDENTS AT UNIVERSITI SAINS MALAYSIA HEALTH CAMPUS**

**ABSTRACT**

Evidence suggests that picky eating exists among undergraduates in Malaysia and could be associated with poor mental health and nutritional status. A cross-sectional study was conducted to investigate intrapersonal factor (disgust sensitivity), interpersonal factors (parental pressure to eat and encouragement to eat), and correlated outcomes (psychological distress and body mass index) associated with picky eating behaviour among nutrition and dietetics undergraduate students at Universiti Sains Malaysia Health Campus. A total of 167 nutrition and dietetics undergraduates aged  $21.19 \pm 1.44$  years (10.2% male and 89.8% female) participated in this study. The mean score of picky eating was  $2.52 \pm 0.62$ . The proportions of non-picky, moderate, and extreme picky eating behaviour were 23.4%, 52.7%, and 24.0%, respectively. The mean scores for disgust sensitivity, parental pressure to eat, and parental encouragement to eat were  $9.54 \pm 1.60$ ,  $3.33 \pm 0.90$ , and  $4.20 \pm 0.65$ , respectively. For psychological distress, it had a mean score of  $20.62 \pm 7.12$ , where 25.7% of nutrition and dietetics undergraduates were found to have a mild level of

psychological distress, 10.2% in a moderate level of psychological distress, and 13.2% in a severe level of psychological distress. The mean BMI was  $21.41 \pm 3.10$  kg/m<sup>2</sup>. The proportion of underweight was 15%, while for overweight, obese class I and class II were 7.2%, 0.6%, and 0.6%, respectively. Disgust sensitivity was significantly predicted picky eating behaviour (Beta = 0.218, R = 0.264, R<sup>2</sup> = 0.070; F (2, 164) = 6.145, p = 0.003). Picky eating was also positively related with psychological distress (Beta = 0.312, 95% CI: 1.905, 5.259, p < 0.001). Similarly, the study indicated a significantly positive relationship between picky eating behaviour and body mass index (Beta = 0.169, 95% CI: 0.087, 1.604, p = 0.029).

# CHAPTER 1

## INTRODUCTION

### 1.1 Background of Study

Picky eating (PE) is defined as the consumption of a small range of foods by avoiding or rejecting a significant amount of both familiar and unfamiliar foods (Taylor *et al.*, 2015). Several terms can be used interchangeably with picky eating, which include selective eating, fussy eating, food fussiness, and faddy eating (Brown *et al.*, 2016; Taylor *et al.*, 2015). Picky eating behaviour has been determined to be one of the obstacles to practicing healthy eating (Dial *et al.*, 2021). The life of adult picky eaters may be linked to poor mental and psychosocial consequences. For example, “anxiety that is related to social eating” and “eating-related quality of life”. The findings of Dial *et al.* (2021) concluded that individuals who have more picky eating behaviours may experience more social phobia, a greater level of overall distress, a greater level of situational distress, and a poorer quality of life. In addition to poor mental and psychosocial consequences, adult picky eaters were more likely to experience poor nutritional status, such as nutrient deficiency and imbalance, when compared to non-picky eater adults. This is because the picky eater usually consumes a limited range of foods (Nagao-Sato *et al.*, 2023). These findings suggest that picky eating may influence both mental and physical health, which might in turn increase the cost of treatment. Therefore, more research is required to ensure a comprehensive understanding of this issue in Malaysia.

Moreover, according to the findings from a few studies conducted in Malaysia, picky eating not only exists among children but may also be found among the young adult population, which includes university students (Kai *et al.*, 2022; Hanapi & Fahmi Teng, 2022; Khattak *et al.*, 2018). However, currently, none of the studies have specifically assessed the picky eating behaviour among undergraduate students enrolled in the courses of nutrition and dietetics in Malaysia. Thus, this study specifically focused on undergraduate students of Nutrition and Dietetics from year 1 to year 4 at the Universiti Sains Malaysia Health Campus to investigate the proportion of picky eating behaviours as well as potential risk factors and outcomes associated with picky eating behaviours. The target population of this study emphasizes undergraduate students of Nutrition and Dietetics because they are future healthcare professionals in the nutrition-related field, which plays a major role in promoting healthy eating habits to prevent or manage diet-related non-communicable diseases. Nutritionists and dietitians who are picky in their diet, which limits certain fruits and vegetables, will be less powerful in convincing their clients or patients to adopt a healthy diet that is rich in fibre. During counselling sessions with clients or patients, they may unintentionally avoid the suggestion of certain foods that are healthy but are disliked by them. Although supposedly based on the fundamental knowledge of nutrition, undergraduate students of Nutrition and Dietetics will practice healthy eating, certain barriers like pickiness in their food intake and an unhealthy food environment might prevent them from doing so (Dial *et al.*, 2021; Kim & Lee, 2020). Hence, it is crucial to determine whether picky eating exists among them or not.

Furthermore, disgust sensitivity is defined as the level of negative emotion that is associated with stimulation and a feeling of disgust. Being more sensitive to disgust would

have the consequence of making the disgust response more prominent, which would raise the drive to stay away from potentially disgusting circumstances (Tolin *et al.*, 2006). People find a lot of things disgusting, such as food, animals, and even their own bodies (Olatunji *et al.*, 2015). High levels of disgust sensitivity could be determined as potential risk factors influencing the body health status. This is because individuals with a high disgust sensitivity may be associated with the action of refusing food sources and possess a more restricted eating pattern (Kauer *et al.*, 2015; Oaten *et al.*, 2009). There were a few studies conducted in other countries that assessed the association between disgust sensitivity and picky eating behaviour. A consistent finding was obtained, in which picky eating behaviour could be influenced by disgust sensitivity (Ellis *et al.*, 2018b; Kauer *et al.*, 2015; Öztürk & Özgen, 2023). Hence, much more verification about the association between those variables needs to be identified in future research, especially for the research conducted in Malaysia.

On the other hand, parental feeding practices are known as the methods that parents use to control and alter their children's timing of eating as well as the amount and types of foods being consumed. These methods can include forcing children to consume more food, limiting specific foods, and monitoring food intake (Ventura & Birch, 2008). The types of feeding practices implemented by parents will influence their children's eating behaviour. For example, the development of healthy eating habits among children may be inhibited by some of the feeding practices, which include restrictive feeding, pressure to eat, and using food as a reward (Fries & Van Der Horst, 2019). The potential influences of parental feeding practices on picky eating behaviour have been determined in various studies that focus on children as the target population (Chilman *et al.*, 2021; Kutbi *et al.*, 2019; Kutbi, 2020). As there is a lack of studies investigating parental feeding practices as a

risk factor for picky eating among young adults, this study will conduct a retrospective measure of parental feeding practices among undergraduate students of Nutrition and Dietetics at Universiti Sains Malaysia Health Campus. This study aimed to determine whether previous parental feeding practices are potential risk factors that may be associated with picky eating during adulthood.

Other than that, the definition of psychological distress has been stated as “an indistinguishable group of symptoms ranging from anxiety and depression symptoms to functional impairment, personality traits (confusing, troubling), and behavioural problems” in the Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (American Psychiatric Association, 2013). The issue of psychological distress is important because it possesses substantial influences on academic performance, study satisfaction, academic engagement, self-efficacy, and dropout rate (Esteban *et al.*, 2022; Wagner *et al.*, 2024). Several factors that may be associated with psychological distress among students have been identified, which include academic future, an excessive workload, conflicts with others, limitations on social interactions, socioeconomic status, parent’s education level, high intensity, and low-intensity exercise (Li *et al.*, 2020; Padrón *et al.*, 2021; Zhang & Liu, 2021). Additionally, various studies have investigated picky eating as a potential factor associated with psychological distress (Barnhart *et al.*, 2021b; Dial *et al.*, 2021; Ellis *et al.*, 2016; Ellis *et al.*, 2018c; He *et al.*, 2020).

On top of that, there is an increasing trend of overweight and obesity among the adult population in Malaysia, which should be given special attention. This is because being overweight or obese will make people more susceptible to certain chronic non-communicable diseases, including cardiovascular diseases, diabetes, cancer, neurological disorders, chronic

respiratory diseases, and digestive disorders (WHO, 2024). Similarly, the issue of being underweight was also important because it was also susceptible to certain health issues such as nutrient deficiency, poor immunity, anaemia, osteopenia, and osteoporosis (NCCFN, 2020). Currently, a few studies have shown that body mass index (BMI) and picky eating behaviour could influence each other in opposite ways, although the research that was conducted to study weight-related influences on picky eating behaviour is quite limited (Ellis *et al.*, 2018b). Among the studies that identified the influence of picky eating on body mass index (BMI), inconsistent findings were found (Berge *et al.*, 2016; Ellis *et al.*, 2018c). Hence, this study is required to investigate whether picky eating behaviour could be a risk factor associated with body mass index (BMI).

## **1.2 Problem Statement**

All the changes in our usual daily lives, due to the Movement Control Order (MCO) and together with the increasing fearfulness of COVID-19, had negatively affected the mental health status of Malaysians. As a result, cases of mental health problems such as depression, anxiety, and stress increased (Shukri *et al.*, 2023). By comparing the prevalence of mental health problems among adults before and during the COVID-19 pandemic, it can be concluded that the prevalence of depression (from 2.3% to the range between 14.3% and 81.7%) and anxiety (from a range between 0.3% and 6.5% to a range between 8.0% and 81.7%) increased during the pandemic. However, for the prevalence of stress, the highest prevalence indicated during the pandemic (56.5%) was almost the same as the value of pre-pandemic (56.0%) (Shukri *et al.*, 2023). Thus, it can be concluded that the prevalence of stress among adults in Malaysia remained high and remained unchanged before and during the COVID-19 pandemic. As a result of the mental health problems, there was an increasing

number of suicides in Malaysia (Ganaprakasam *et al.*, 2021). Thus, it is crucial to implement an effective intervention to improve the mental health status of adults in Malaysia. But, before that, it is important to identify and address the factors that could lead to mental health problems. In addition to biological factors, financial factors, social factors, academic factors, psychological factors, and COVID-related factors that influence mental health status, “picky eating behaviour” is another potential contributor to mental health problems (Barnhart *et al.*, 2021b; Dial *et al.*, 2021; Shukri *et al.*, 2023).

This study has focused on “picky eating behaviour” because, currently, there are only a few studies investigating this issue among adults. The IIUM’s study indicates that there were cases of picky eating among university students, with an overall prevalence of 58.31% (Khattak *et al.*, 2018). Besides, various studies conducted in other countries have shown a positive correlation between picky eating behaviour and negative psychological consequences (Barnhart *et al.*, 2021b; Dial *et al.*, 2021). This was supported by the studies that conducted the measurement of depression and obsessive-compulsive disorder symptom severity, and a higher score was found among adults with picky eating. Additionally, adults with picky eating have also been identified with a poorer quality of life that is related to eating (Kauer *et al.*, 2015; Wildes *et al.*, 2012). This may be due to the reasons that adults with picky eating may feel that their behaviour is abnormal and have a feeling of shame in social dining situations (Thompson *et al.*, 2015). These negative feelings not only affect the quality of life but also contribute to the greater risk of poorer mental health status (Richardson *et al.*, 2022). When adult picky eating is severe enough to cause the symptoms of avoidant/restrictive food intake disorder (ARFID), it will appear to be correlated with

increased symptoms of depression, obsessive-compulsive disorder (OCD), and social anxiety (Kauer *et al.*, 2015; Wildes *et al.*, 2012).

In summary, from the previous studies, we know that picky eating behaviour has a potential influence on mental health problems. Therefore, to improve mental health status, it is important to modify picky eating behaviour. Before the modification of picky eating behaviour can be carried out, it is essential to obtain a comprehensive understanding of “the potential factors associated with picky eating behaviour” to ensure that an appropriate strategy can be implemented to address the particular factors that lead to picky eating. Additionally, the factors associated with picky eating behaviour are important because they can help people predict and identify the presence of picky eating behaviours. Besides, it also provides the chance for earlier intervention, which can prevent the progress of picky eating behaviours to a severe degree and further protect the individual from mental health problems. On the other hand, potential outcomes such as nutrient deficiency, psychological distress, and a low or high body mass index that may be associated with picky eating behaviours also need to be investigated to increase the public’s awareness regarding these issues.

It is important to note that, except for the “gender” factor that has been addressed in the IIUM study, the research about the other potential factors associated with picky eating, such as sociodemographic variables (socioeconomic status), disgust sensitivity, parental influence (parental pressure to eat and encouragement to eat), early negative experience with food, sensory sensitivity, and body mass index, has only been studied among adult and college students in other countries but is lacking in Malaysia (Dial *et al.*, 2021; Ellis *et al.*, 2018b; Nagao-Sato *et al.*, 2023; Zickgraf & Schepps, 2016). Additionally, other outcome

variables, including physical health, psychological distress, and body mass index, that could be associated with picky eating behaviours are also being understudied in Malaysia (Barnhart *et al.*, 2021b; Dial *et al.*, 2021; Ellis *et al.*, 2016; Ellis *et al.*, 2018c; Nagao-Sato *et al.*, 2023; He *et al.*, 2020). Thus, it is essential to assess the association between those variables in Malaysia's adults or university students to compare the results and check whether the findings of our Malaysian adult population are in line with previous findings or not.

Therefore, the potential factors (sociodemographic variables, disgust sensitivity, and parental influences) and potential outcomes (psychological distress and body mass index) that are associated with picky eating were identified in this study. If the result shows a significant association between those variables and picky eating, all of them must be taken into account in the intervention to improve picky eating behaviour and further reduce the prevalence of mental health problems.

### **1.3 Objectives**

#### **1.3.1 General Objectives**

To investigate the relationship between sociodemographic variables (gender and socioeconomic status), intrapersonal factor (disgust sensitivity), interpersonal factors (parental influence: parental pressure to eat and encouragement to eat), psychological distress, body mass index, and picky eating behaviour among Nutrition and Dietetics undergraduate students at Universiti Sains Malaysia Health Campus.

### **1.3.2 Specific Objectives**

1. To examine sociodemographic variables (gender and socioeconomic status), intrapersonal factor (disgust sensitivity), interpersonal factors (parental influence: parental pressure to eat and encouragement to eat), psychological distress, and body mass index of Nutrition and Dietetics undergraduate students at Universiti Sains Malaysia Health Campus.
2. To determine the proportion of picky eating behaviour among Nutrition and Dietetics undergraduate students at Universiti Sains Malaysia Health Campus by using the Adult Picky Eating Behaviour Questionnaire (APEQ).
3. To determine the contribution of sociodemographic variables (gender and socioeconomic status), intrapersonal factor (disgust sensitivity), and interpersonal factors (parental influence: parental pressure to eat and encouragement to eat) toward picky eating behaviour among Nutrition and Dietetics undergraduate students at Universiti Sains Malaysia Health Campus.
4. To determine the relationship between picky eating behaviour, psychological distress and body mass index among Nutrition and Dietetics undergraduate students at Universiti Sains Malaysia Health Campus.

## **1.4 Hypothesis**

### **1.4.1 Null Hypothesis**

1. Sociodemographic variables (gender and socioeconomic status), intrapersonal factor (disgust sensitivity), interpersonal factors (parental influence: parental pressure to eat and encouragement to eat) do not contribute significantly toward picky eating behaviour among Nutrition and Dietetics undergraduate students at Universiti Sains Malaysia Health Campus.

2. There is no significant relationship between picky eating behaviour, psychological distress and body mass index among Nutrition and Dietetics undergraduate students at Universiti Sains Malaysia Health Campus.

### **1.4.2 Alternative Hypothesis**

1. Sociodemographic variables (gender and socioeconomic status), intrapersonal factor (disgust sensitivity), interpersonal factors (parental influence: parental pressure to eat and encouragement to eat) contribute significantly toward picky eating behaviour among Nutrition and Dietetics undergraduate students at Universiti Sains Malaysia Health Campus.

2. There is significant relationship between picky eating behaviour, psychological distress and body mass index among Nutrition and Dietetics undergraduate students at Universiti Sains Malaysia Health Campus.

## **1.5 Research Questions**

1. What is the proportion of picky eating behaviour among Nutrition and Dietetics undergraduate students at the Universiti Sains Malaysia Health Campus by using Adult Picky Eating Questionnaire (APEQ)?
2. What are the predictive factors of picky eating behaviour among Nutrition and Dietetics undergraduate students at the Universiti Sains Malaysia Health Campus?
3. Does picky eating behaviour appear to be related with psychological distress and body mass index among Nutrition and Dietetics undergraduate students at the Universiti Sains Malaysia Health Campus?

## **1.6 Significance of Study**

The picky eating (PE) problem exists among IIUM students. In the total population of 403 students, about 235 students have been identified as having picky eating problems. The overall prevalence of picky eating reported by the study was 58.31% (Khattak *et al.*, 2018). This finding provides insight into a future study whereby university students could be one of the populations at risk of picky eating. The picky eating problem is important because it may further affect the individual's physical, mental, and psychosocial well-being (Dial *et al.*, 2021; Nagao-Sato *et al.*, 2023). By practicing healthy eating behaviours without being picky about food intake, it could be ensured that adults will consume a wide variety of fruits and vegetables. Therefore, without limiting their food choices, adults will meet the

recommended daily serving of fruits and vegetables more easily and thus can ensure the adequacy of nutrient intake (Ellis *et al.*, 2018a; Nagao-Sato *et al.*, 2023). More information is needed to understand the factors that are potentially associated with picky eating among university students. This study could contribute to the body of knowledge and provide valuable insight into the potential factors and correlated outcomes associated with picky eating behaviour among Nutrition and Dietetics undergraduate students at USM Health Campus. The findings from this study will also provide fundamental details on picky eating, whereby four different aspects of picky eating (Meal Disengagement, Meal Presentation, Food Variety, and Taste Aversion) as well as the overall general aspect of picky eating will be assessed. This is different from some of the previous studies that only determined the general aspect of picky eating.

Moreover, the findings from this study will also provide essential details on disgust sensitivity, which assessed the reaction to the stimuli based on a sense of offensiveness and the risk of illness (Olatunji *et al.*, 2007). This disgust sensitivity was not commonly known; thus, involving it in this study could help to attract the public's attention and concern in this aspect. Other than that, this study also implemented a retrospective assessment of university students' opinions of how their parents fed them when they were small (Ellis *et al.*, 2018b). A limited study has involved retrospective measures of parental feeding practices; thus, this study could contribute to some degree to filling the research gaps. On the other hand, both variables (disgust sensitivity and parental feeding practices) were rarely assessed together in the same study. Therefore, involving them in this study is important because it could help provide a more comprehensive understanding of the intrapersonal and interpersonal factors associated with picky eating.

Apart from that, this study should be carried out due to the lack of studies in Malaysia that have focused on picky eating among young adults. The prevalence of picky eating among young adults across Malaysia was unknown. It is unlike the prevalence of overweight, obesity, and underweight, which have always been kept track of from time to time through the NHMS 2011, NHMS 2015, and NHMS 2019. A thorough understanding of the potential factors and outcomes associated with picky eating behaviour was crucial to ensuring that an effective and successful intervention program could be developed to promote healthy eating behaviour as well as a healthy body and mind among young adults in Malaysia. Moreover, this study offered baseline information for upcoming research concerning potential factors and outcomes associated with picky eating behaviour among university students. Therefore, it is essential to discover this issue to assist other researchers, psychologists, nutritionists, dietitians, healthcare practitioners, and health promotion coordinators in determining an effective strategy to enhance the physical health, mental health, and quality of life of young adults in Malaysia.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Picky Eating

##### 2.1.1 Definition of Picky Eating

Picky eating is currently not universally defined. Hence, there is no consensus on the best way to measure it. The term "picky eating" has been defined in a variety of ways in research settings. According to Dovey *et al.* (2008), picky eating might involve some extent of food neophobia, and individuals with picky eating tend to consume an insufficient range of food by avoiding a significant number of familiar foods, unfamiliar foods, or foods with particular textures. Based on the study by Hafstad *et al.* (2013), picky eating can be defined as the behaviour of rejecting food items, which can lead to an inability to consume foods with adequate quantity and variety. Furthermore, picky eating can be defined through various characteristics such as a lack of interest in trying new foods, having strong preferences for certain foods (likes or dislikes), a need for special food preparation, having a limited number of food items in the diet, or limiting consumption of vegetables and some other food categories (Horst, 2012; Horst *et al.*, 2014).

Additionally, certain studies have analysed the answers from the eating habits questionnaires to define aspects of picky eating. For example, according to Tharner *et al.* (2014), various aspects like low food enjoyment, low food responsiveness, high food fussiness, slowness in eating, and high satiety responsiveness have been classified under the

profile of picky eating based on the information from the Child Eating Behaviour Questionnaire (CEBQ). In this study, the focus was given to the general aspect of picky eating and specific aspects of picky eating that fall under the picky eating profiles of the Adult Picky Eating Questionnaire (APEQ). Those picky eating profiles comprise four different specific aspects of Meal Presentation, Meal Disengagement, Food Variety, and Taste Aversion (Ellis *et al.*, 2017).

### **2.1.2 Characteristics of Picky Eating**

Currently, none of the studies have standardized or listed out the common characteristics of adult picky eaters. However, based on previous studies, adult picky eaters could be characterized based on unusual eating behaviours and attitudes toward foods. Those characteristics may include rejection of foods due to colour, taste, and texture; being less likely to enjoy their meals; recognizing themselves as unhealthy eaters; demonstrating more obsessive-compulsive disorder symptoms; having a greater sensitivity to disgust and food neophobia; and having depression symptoms as well as intense taste perception (Kauer *et al.*, 2015).

In contrast, various studies have identified certain common characteristics of picky eating among children. Those characteristics are having a limited amount of food consumption; food rejection (especially fruit and vegetables); accepting a small range of foods; having strong food preferences; favouring beverages over foods; requiring special food preparation; having a longer mealtime; hiding food in other foods or drinks; and using distraction while eating (Chao & Chang, 2017; Mascola *et al.*, 2010; McCormick & Markowitz, 2013).

### 2.1.3 Prevalence of Picky Eating among Children and Adults

It is important to note that, currently, there are not many studies that investigate picky eating in the adult population. Most studies were focused on identifying the prevalence of picky eating among the child population. According to research conducted in the United States, picky eating is prevalent in childhood and adulthood, with estimations ranging widely but convergent on a lifetime prevalence of 15% to 35% (Kauer *et al.*, 2015; Taylor *et al.*, 2015; Zickgraf *et al.*, 2016). Based on the study done by Zohar *et al.* (2020), the prevalence of persistent picky eating among Israel's children between the ages of 3 to 8 years old is 3.9%. Moreover, research conducted in Taiwan showed that about 62% of children were classified as picky eaters overall (Chao & Chang, 2017). In Malaysia, the prevalence of picky eating among children has been reported by a study conducted in Kuala Lumpur, which showed that about 38% of school children have this problem (Kai *et al.*, 2022).

Apart from that, a few studies have investigated the prevalence of picky eating among adults and college students. According to research conducted in the United States, about 30% to 35% of adults have at least a little pickiness in their food intake (Kauer *et al.*, 2015; Zickgraf *et al.*, 2016). However, the study by Ellis *et al.* (2018c) showed that the prevalence of picky eating among United States adults is just 18.1%. Other than that, the study that was conducted on Chinese college students showed that the prevalence of picky eaters and severe picky eaters is 19.4% and 3.3%, respectively (He *et al.*, 2020). In Malaysia, the only study that identified the prevalence of picky eating among young adults showed that about 41.69% of IIUM students were not picky eaters; 32.26% of IIUM students have moderate picky eating behaviour; and 26.05% of IIUM students have extremely picky eating behaviour. Overall, the IIUM study showed that more than half of IIUM students (58.31%) encountered picky

eating behaviour and mentioned the need to solve the issue (Khattak *et al.*, 2018). Thus, due to the discrepancy in the prevalence as well as the lack of findings about the prevalence of picky eating among adult and university students, it is essential to conduct further investigation, especially in Malaysia.

#### **2.1.4 Continuity of Picky Eating from Childhood to Adulthood**

A few studies showed that picky eating that developed during early childhood could be continued until adulthood. According to results from a cohort study, it was verified that the picky eating behaviour that begins at the age of 3 years old can be continued until 23 years old. This was supported by the data, which showed that 6 out of 10 children who developed picky eating since the age of 3 years old remained as picky eaters at 23 years old. Moreover, the same study also revealed that the longer the duration of being a picky eater during childhood (2 to 11 years old), the greater the tendency to continue it during adulthood (23 years old). For example, the study showed that for children who had picky eating behaviours for six years or more during childhood (observing age: 2 to 11 years old), 100% of them were found to have this picky eating behaviour during adulthood (observing age: 23 years old). While for children who have picky eating behaviour for two years (2 to 3 years old) or three years (2 to 4 years old) during childhood, only 17% of them were reported to have picky eating behaviour at 23 years old (Van Tine *et al.*, 2017).

In addition, this study also mentioned that about 35% of picky eaters started to develop picky eating behaviours during adolescence or young adulthood. Hence, it can be concluded that the onset of picky eating behaviour was not only limited to childhood. However, this study does not prove that persistent picky eaters will become more obese or

prone to eating disorders (Van Tine *et al.*, 2017). This finding about the possibility of persistent picky eating behaviour was in line with Cano *et al.* (2015a), which showed that about 4% of children who had been identified as picky eaters at one year old continued to be picky eaters at six years old. They also mentioned that, even though picky eating behaviour commonly appears to decline after preschool age, some people may continue to experience it during adulthood.

## **2.2 Socioecological Approach and Food-Related Behaviour**

In the socioecological approach, the multiple factors (intrapersonal, interpersonal, organizational setting, community, environment, and political influences) that influence individual behaviour at different levels are taken into account, and their interactions with one another are examined to determine the behaviour. Understanding the interaction between the multiple levels of determinants is essential, as it could assist in developing multifaceted interventions. These interventions, in turn, can effectively promote behaviour changes (Lang & Rayner, 2012).

According to the scoping review by Brian *et al.* (2023), it was found that intrapersonal factors, interpersonal factors, and environmental factors are the three main factors that have been investigated across 34 studies in Malaysia to understand the potential factors that could be associated with influencing eating behaviour. Involving intrapersonal factors in the study is very important because nearly half of the previous studies focused on examining the association between intrapersonal factors and the eating behaviour of young Malaysians. In this study, instead of investigating intrapersonal factors solely, interpersonal factors are also involved to provide a more comprehensive understanding of the factors that

could be associated with picky eating behaviour. Hence, with the support of previous researchers that investigated picky eating behaviour among adults, this study decided to emphasize disgust sensitivity and parental influences (pressure to eat and encouragement to eat), which could be categorized under intrapersonal factors and interpersonal factors, respectively.

### **2.2.1 Intrapersonal Factor: Disgust Sensitivity**

According to the socio-ecological model, the individual's characteristics and factors are included in the intrapersonal factor (Harley *et al.*, 2020). Besides, another study noted that intrapersonal factors also involve the identification of people's idea or identity. The examples of factors that can be categorized under the intrapersonal factors are attitudes, body image, body dissatisfaction, genetic factors, individual's internal value, knowledge, motivations, perceptions, symptoms of depression, and the sensitivity to taste (Brian *et al.*, 2023). In this study, disgust sensitivity has been classified under the intrapersonal factor due to the reason that the genetic factors can contribute roughly fifty percent of chance in shaping the people's degree of sensitivity to disgust (Sherlock *et al.*, 2016). Additionally, another study has shown that the degree of disgust sensitivity is correlated with the 6-n-propylthiouracil (PROP) taste sensitivity, which is primarily determined by genetics and minimally by environmental factors (Herz, 2011). The latest finding by Tybur *et al.* (2020) showed that about 34% of the variation in disgust proneness was explained by genetic factors.

### **2.2.2 Interpersonal Factors: Parental Influence**

For the interpersonal level in the socioecological model, the interaction of people with others, including family and friends will be taken into the consideration (Golden & Earp, 2012). The parental feedings practices, relationship with family and friends are various examples that can be classified as interpersonal factors (Brian *et al.*, 2023). In this study, parental influences (pressure to eat and encouragement to eat) refer to the retrospective measure of parental feeding practices during childhood; thus, they were classified under the category of interpersonal factors. It is essential to involve parental influences in this study because there are only a limited number of studies that have explored its association with picky eating behaviour among young adults. Moreover, some of the existing studies found a consistent finding about the potential relationship between parental feeding practices and picky eating behaviour among children and young adults (Berge *et al.*, 2020; Brown *et al.*, 2022a; Chen *et al.*, 2024; Ellis *et al.*, 2018b). On the other hand, it is well known that parents play a significant role in shaping their children's feeding environment, eating experience, and eating behaviour (Mahmood *et al.*, 2021). Therefore, involving parental influence as an interpersonal factor to investigate its association with adult picky eating behaviours is necessary.

### **2.3 Potential Factors Associated with Picky Eating**

Previous studies have been worked on focusing the population of young adults or college students in determining the potential association between various factors and picky eating behaviour. Those factors include sociodemographic variables (race, education, income, age of parent, picky eating age, and gender), earlier negative experiences with foods, disgust

sensitivity, sensory sensitivity, sensory rejection, body mass index, and parental influences (pressure to eat and encouragement to eat) (Ellis *et al.*, 2018b; Kauer *et al.*, 2015; Nagao-Sato *et al.*, 2023).

Based on previous findings, no association was found between sociodemographic variables (race, education, parent age, picky eating age) and picky eating behaviour (Ellis *et al.*, 2018b). While, for sociodemographic variables of income/socioeconomic status, and gender, inconsistent findings were reported (Dial *et al.*, 2021; Ellis *et al.*, 2018b; Kauer *et al.*, 2015; Zickgraf & Schepps, 2016). Hence, in this study, the factors of socioeconomic status and gender were involved as sociodemographic variables to clarify their association with picky eating behaviour.

Moreover, for the body mass index, one study assessed it as a predictor factor of picky eating and indicated an association with different aspects of picky eating behaviour. Specifically, their results found two main findings. First, a negative association was found between greater body mass index and Meal Disengagement. Secondly, a positive association was indicated between greater body mass index and picky eating-related low Food Variety (Ellis *et al.*, 2018b). However, most of the studies treated body mass index as an outcome variable that was associated with picky eating behaviour. Thus, in this study, the variable of body mass index was categorized as the outcome variable of picky eating behaviour due to the majority consensus among earlier researchers.

Furthermore, other factors, such as earlier negative experiences with foods, disgust sensitivity, sensory sensitivity, sensory rejection, and parental influences (pressure to eat and encouragement to eat), were found to be associated with picky eating (Ellis *et al.*, 2018b;

Kauer *et al.*, 2015; Nagao-Sato *et al.*, 2023). However, this study will only emphasize disgust sensitivity and parental influences (pressure to eat and encouragement to eat). This is due to the reason that less investigation has been done on these two factors, which requires more research to prove the potential association with picky eating. Disgust sensitivity and parental influences (pressure to eat and encouragement to eat) could be categorized as intrapersonal factors and interpersonal factors, respectively, which may enable us to understand the determinants of picky eating behaviour through a socioecological approach.

### **2.3.1 Sociodemographic Factors**

#### **2.3.1.1 Gender and Picky Eating**

When looking at the general aspect of picky eating, the study by Ellis *et al.* (2018b) showed that gender was the only sociodemographic factor they found to be associated with picky eating among adults. In their study, females were less likely to be associated with higher levels of picky eating behaviour. This finding was supported by a study conducted among Chinese young adults, whereby, their finding revealed that women were considerably less likely to be associated with picky eating profiles when compared to moderate and approaching eating profiles (He *et al.*, 2020). Additionally, another study also showed that men will report more picky eating behaviour and intuitive eating but less disordered eating than females (Ellis *et al.*, 2018c).

However, a contrasting finding was obtained in another study that also focused on the adult population, in which severely picky eating behaviour was more likely to be reported by

women than men. However, for this study, a large number of study participants were drawn from an adult picky eater online support group; thus, they might not accurately represent the adult populations with severe picky eating (Zickgraf & Schepps, 2016). On the other hand, there was a study that stated gender differences in picky eating were not found (Kauer *et al.*, 2015). Similarly, another study also showed that there were no distinct differences in the classification of picky eating and typical eating among men and women, suggesting an equal proportion for both genders within the category of picky eating (Zickgraf *et al.*, 2016). Furthermore, according to the result from the IIUM study, the association between gender and picky eating behaviour was unclear, as their result only showed that a high percentage of females were found in both picky eating (84.3%) and non-picky eating categories (78.6%). This result may be due to the discrepancy in the participation of males (18.1%) and females (81.9%) in the study.

When referring to the specific subscale of picky eating (Meal Presentation, Meal Disengagement, Food Variety, and Taste Aversion), consistent results were only obtained for Food Variety and Taste Aversion. Whereby, various studies showed that females were less likely to be associated with the subscale of Food Variety that measured a limited dietary range (Badari *et al.*, 2012; Ellis *et al.*, 2018b). According to Badari *et al.* (2012), a higher food diversity score was more likely to be reported by females when compared with males. Whereas, for the subscale of Taste Aversion, a non-significant association with gender factors was found (Ellis *et al.*, 2018b; Robin *et al.*, 2003). This was supported by the study that pointed out the similarities in bitter taste rejection among men and women (Robin *et al.*, 2003). Regarding the Meal Disengagement subscale of picky eating, Ellis *et al.* (2018b) reported that females were less likely to be associated with this subscale. However, in another

study, females were hypothesized to be more associated with this subscale than males. This is because their result showed that a slightly higher score of food avoidance was reported by females when compared to males (Coakley *et al.*, 2022). Moreover, according to Cavazza *et al.* (2015), the Meal Presentation subscale of picky eating tends to be associated with females, because they suggested that females reported a stronger desire to eat foods that were smaller in amount and elegantly presented than males. Nevertheless, an opposite finding was obtained by another researcher, who reported that females were less likely to be associated with the subscales of Meal Presentation (Ellis *et al.*, 2018b).

These contradictory results from the previous studies could be explained by variations in how picky eating is measured (such as self-report or single-item measurement), especially regarding the fact that varied aspects of picky eating (Meal Presentation, Meal Disengagement, Food Variety, and Taste Aversion) have not been investigated in some of the studies before (Ellis *et al.*, 2018b).

### **2.3.1.2 Socioeconomic Status and Picky Eating**

Based on a previous study that classified socioeconomic status (SES) into five groups (two lower SES and three higher SES), it was found that college students from the three higher socioeconomic status groups were associated with lower levels of picky eating when compared to the college students from the other two lower socioeconomic status groups (Elkins & Zickgraf, 2018). This finding was consistent with the studies that focused on children as the target population, whereby the results showed that children from families with high socioeconomic status or high income were less likely to be associated with picky eating (Cano *et al.*, 2015b; Tharner *et al.*, 2014).