DOES PICKY EATING BEHAVIOR EXIST IN UNIVERSITY STUDENTS?

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ABSTRACT

The aim of this study was to assess picky eating behavior existence among university students. This was an observational cross sectional study design. The sample size was calculated by using single proportion formula based on the adult prevalence of picky eating of 28.7 % which gives a sample of ~ 324 students. However, 407 students online registered to participate out which 403 students responded. A set of questionnaire was posted online. The questionnaire contained three sections which are demographic information, determinants of picky eating behavior and normal eating behaviors. Furthermore, the students were categorized as non-picky eating behavior, moderate picky eating behavior, and extreme picky eating behavior. The statistical analysis carried out was mainly descriptive in order to determine the extent of picky eating behavior among the university students. Student t-test was used to find the differences between picky and non-picky eaters in terms of eating behaviors. Among the students possessing non picky eating behavior, moderate picky eating behavior and extreme picky eating behavior were 168 (41.69%), were 130(32.26%), 105(26.05%) respectively. On overall basis 235(58.31 %) of the students were having picky eating behavior. The present study revealed that picky eating behavior exists among the university students which need to be addressed.

KEYWORDS: Picky eating, Food neophobia, Eating behavior

INTRODUCTION

Picky eating behavior encompasses several terms like food neophobia or neophobic condition or fussy eating behavior which mostly exists among children (Smith, *et al*., 2005 and Smith, *et al*., 2015). Food pickiness and food neophobia are interrelated in which food neophobia becomes one of the components of picky eating behavior (Dovey, *et al*., 2008). Muhammad, *et al*., (2015) define food neophobia as to be reluctant to try new foods. University students are expected to have more stable food neophobia due to their education and thus low picky eating behavior (Olabi, *et al*., (2009). Food acceptances varies among individuals Dovey, et al.,(2008). Any unresolved food neophobia during childhood may persist till adulthood (Marcontell, et al., (2003). Avoidant/restrictive food intake disorder (ARFID) is an eating or feeding disturbance in which there is avoidance based on the sensory characteristics of food (American Psychiatric Association, 2013). However, it is in patients with clinically significant eating problems rather than normal individuals (Norris, *et al*., 2016). There is no straight definition for picky eating behavior but is believed to have least varied food, including restricted consumption of foods based on sensory attributes (Wildes, *et al*., 2012) may be classified as picky eating behavior or picky eating behavior with refusal of new foods with higher food avoidance (Tharner, *et al*., 2014). Preferences towards food selection and acceptability develops in early childhood (Mooney, *et al*., 2012 and Jacobi, *et al*., 2008). The picky eating and neophobic condition may result in poor growth and nutrients deficiencies (Jansen *et al*., 2012) with the symptoms of anxiety, hypersensitivity to taste and texture (Segovia, 2015). Studies on adult picky eating behavior are still limited but it is believed that symptoms are consistent with the characteristics of picky eating behavior of children (Wildes, *et al*., (2012).

University students are known to have poor eating habits which make them also susceptible to nutritional inadequacy (Li, *et al*., 2012). Malaysian Adults Nutrition Survey (MANS) in 2014 reported that Malaysians aged 18 years old and above consume less fruits and vegetables in their diets (Fallis, 2014 and Abdull, *et al*., 2012) with some ethnic difference reportedly Malay tend to be possessing picky eating behavior compared Chinese and Indian (Loh, 2013). As mentioned earlier, limited studies specifically on picky eating behavior are very limited in adults including university students. Therefore, this was an effort to assess picky eating behavior in the Malaysian university students.

METHODOLOGY

Location, design and sample size

This study was conducted in the International Islamic University of Malaysia (IIUM) Gombak and Kuantan Campuses. This study was intended to be conducted among undergraduate students of various disciplinary, races, both male and. The university students who were 18-25 years old included whereas students below 18 years or above 25 years were excluded from this

study. This study design is an observational cross sectional study design. Subjects were assessed to find the prevalence of picky eating behavior in their respective campuses and comparing the eating habits between picky and non- picky eaters among the participants. The sample size was calculated by using single proportion formula based on the adult prevalence of picky eating of 28.7 % (Wildes, Zucker, & Marcus, 2012) which gives a sample of ~ 324 students. However, 407 students online registered to participate out which 403 students responded.

Questionnaire

A set of questionnaire were distributed via online survey in which the participants were invited to access an online survey ''Comparison of Prevalence and Correlation of Picky Eating Behavior of Students in International Islamic University of Malaysia (IIUM) Kuantan and Gombak Campuses" available at: https://goo.gl/forms/unUksCeKzQCK72YE3. Upon to start filling in the questionnaire, participants were required to signed the consent form indicated that they were 18 years old and above, not in pregnancy (for female) and were willing to take part in the study

In the present study, the inspiration was gained from the Children's Eating Behaviors Questionnaire (CEBQ) which was originally developed by (Wardle, Guthrie, Sanderson, & Rapoport , 2001) also the extended version of self- reported CEBQ has been used by Kauer *et al.* (2015) to determine characteristics of eating behavior among adults. In our study, a set of Eating Behavior Questionnaire (EBQ) with 53 questions was used. This questionnaire contains three sections i.e. demographic information, determinants of picky eating behavior and eating behaviors. Prior commencing the survey a pilot study conducted due to the changes made to the available CEBQ on university students. In the pilot study 32 students (10 % sample size) were randomly picked within the university campus for possible correction to be made to CEBQ. Appropriate changes were made to the CEBQ after the response obtained from the pilot study.

In the first section, self-reported CEBQ responses were recorded using a five-point Likert scale (1 = never, 2 = rarely, 3 = sometimes, 4 = often and 5 = always).

In the second section of the questionnaire distinguished participants who exhibit picky eating behavior. In this section, CEBQ questions on picky eating characteristics used by Loh *et al*. (2013) consists of 4 questions were also used in this questionnaire. The questions were "I am difficult to please with meals", "I decide that I don't like a food even without tasting it", "I leave food on my plate at the end of a meal" and "I get full before I finish my meal".

The third section had a total 49 questions under 10 main categories of eating behaviors which were narrow ranged to neophobia, taste, texture and appearance rejections, contact or mixing, ritualization or repetition, interest in food or social eating, healthy eating and other eating behavior. Several questions were excluded because they did not correspond to picky eating-related behavior. Age and cultural differences were considered when modifications were

required in making the questionnaire. For the food neophobia section, this study substituted questions from the study done by Loh *et al*. (2013) on determining the characteristics of neophobia among participants. Apart from that, under category contact or mixing, "I almost always reject foods that are mixed or combined", "I try not to let different foods touch on my plate" and "I almost always reject foods that have touched on the plate" are removed in consideration with Malaysia culture that mix different types of food in one plate.

Statistical analysis

The statistical analysis was performed using Statistical Package for the Social Science (SPSS) version 16.0 to perform statistics on the collected data. Mainly descriptive statistic was used to determine prevalence of picky eating behavior. The mean of each item scores was calculated and pickiness was classified as non-picky, moderate and extreme picky eaters. Furthermore, t-test was used to find the differences between picky and non-picky eaters in terms of eating behaviors.

RESULT

General characteristics of the respondents

The general characteristics of the participants are shown in the Table 1. The age arrange of the respondents was 19-36 years. Majority of the participants 23 years (n = 147, 36.5 %), while least numbers of the respondents respondent was 19 years (n = 1, 0.2%). The other participants were aged 20 (6.7 %), 21 (14.6 %), 22 (23.8 %), 24 (12.7 %) and 25 (5.5 %) years old. In terms of gender, female were 81.9 % (n = 330) and male were 18.1 % (n = 73) of the total respondents. Ethically most of the respondents were Malay (98.5 %, n = 397), 0.5 % (n = 2) Indians and 1 % (n = 4) others.

Table 1 General Characteristics of the Respondents

Age	Frequency (Numbers)	Percentage (%)
19	1	0.2
20	27	6.7
21	59	14.6
22	22	23.8
23	96	36.5
24	147	12.7
25	51	5.5
Gender		
Male	73	18.1
Female	330	81.9
Race		
Malay	397	98.5

Indian	2	0.5
Others	4	1.0
Total	**407**	**100**

Prevalence of picky eating behavior

The prevalence of picky eating behavior among the university students was 58.3 % (n = 235) while 41.7 % (n = 168) were with non- picky eating behavior as shown in the Figure 1.

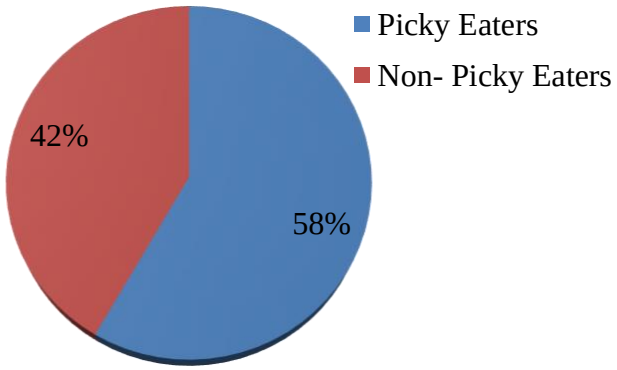

Figure 1 Prevalence of picky eating behavior classification of picky eating behavior

The eating behavior results on pickiness classification into the categories of non-picky eating behavior, moderate picky eating behavior and extreme picky eating behavior among the respondents are shown the Table 2. It is evident from the result that majority of them were with picky eating behavior and most of them were in the category of moderate picky eating behavior followed by extreme picky eating behavior. Among the picky eaters, 84.3% (n = 198) were female and 15.7% (n = 37) were male; whereas in the non-picky eaters 78.6 % (N= 132) were female and 21.4 % (36) were male respondents.

Table 2 Classification of the respondents according to picky eating behavior category

Conditions	(Numbers)	(%ages)
Non- picky eating behavior	168	41.69
Moderate picky eating behavior	130	32.26
Extreme picky eating behavior	105	26.05

Neophobia

There were four components under the neophobic eating behavior. The data in the Table 3 shows a significant difference between the picky and non-picky eaters in terms of refusal to try new food, pleasure to taste new foods, enjoy a wide variety of foods and interest in tasting new food. Comparing the means scores of the respondents it appears that the, picky are more likely to refuse trying new foods than non- picky eaters. Furthermore the results indicates that non-picky eaters enjoy tasting new food from wide variety of foods and seems to be more interested in tasting new food compared to picky eater. Majority of the respondents having picky eating behavior were narrow range eaters compared to non-picky eating behavior (Table 3).

Table 3 Comparison of neophobia and narrow range eating behaviors among picky and non-picky eaters

Comparison of Neophobia			
Response Factors	Picky Eaters Mean (SD) (N = 235)	Non-Picky Eaters Mean (SD) (N = 168)	*Significance Level*
I refuse to try new foods at first.	2.76 (1.214)	2.35 (1.263)	P< 0.001
I enjoy tasting new foods.	3.55 (1.082)	3.87 (1.140)	P< 0.01
I enjoy a wide variety of foods.	3.93 (1.023)	4.18 (1.013)	P< 0.05
I am interested in tasting food I haven't tasted before.	3.63 (1.117)	3.94 (1.071)	P< 0.01
Comparison of Narrow Range Eating Behavior			
I eat from a very narrow range of foods (fewer than 10 different foods).	2.99 (1.200)	2.57 (1.302)	P< 0.001
I almost always avoid one or more major group(s) of foods.	2.89 (1.122)	2.39 (1.105)	P<0.001
I almost always avoid red meat.	2.02 (1.058)	1.92 (1.127)	NS
I almost always avoid chicken.	1.71(1.004)	1.47 (0.759)	P< 0.01
I almost always avoid fish.	2.00 (1.074)	1.92 (1.122)	NS
I almost always avoid vegetables.	2.30 (1.325)	1.85 (1.050)	P< 0.001
I almost always avoid milk.	2.15 (1.315)	1.83 (1.170)	P< 0.05

I almost always avoid grains.	2.06 (1.009)	1.77 (0.868)	P< 0.01
I almost always avoid sweets.	2.61 (1.212)	2.44 (1.265)	NS

Sensory rejection

The data on the **t**hree types of sensory rejections i.e. taste; texture and appearance are shown in the Table 4 as well. The data on the comparison of taste rejection between picky and non-picky eaters show no difference (Table 4). The sensory rejection based on texture included rejection on crunchiness, gelatinousness, chewiness and slipperiness of foods; among the respondents only gelatinousness and chewiness of foods were the causes of rejections among picky eaters (Table 4). There were significant differences among the picky and non-picky eaters for the preferences of coloured foods as shown in the Table 4.

Table 4 Rejection of food based on Taste, Texture and Appearance

Rejection of food based on Taste			
	Picky Eaters Mean (SD) (N = 235)	Non-Picky Eaters Mean (SD) (N = 168)	*Significance Level*
I almost always reject bitter foods, even if they are only slightly bitter.	3.31 (1.105)	3.23 1.197)	NS
I almost always reject sour foods.	2.65 (1.113)	2.60 (1.164)	NS
I almost always reject salty foods.	3.26 (1.179)	3.04 (1.158)	NS
I almost always reject sweet foods.	2.76 (1.052)	2.57 (1.114)	NS
Rejection of food based on Texture			
I almost always avoid crunchy foods.	1.94 (0.852)	1.93 (0.826)	NS
I almost always avoid gelatinous foods.	2.83 (0.961)	2.60 (1.004)	P< 0.05
I almost always avoid very chewy foods.	2.82 (1.047)	2.58 (1.022)	P< 0.05
I almost always avoid slippery or "slimy" foods (ie. Oyster).	2.82 (1.159)	2.72 (1.183)	NS
Rejection of food based on Appearance			
I almost always reject only foods that are a particular color.	2.35 (0.992)	2.15 (1.019)	P< 0.05
I almost always prefer to eat only foods that are a particular color.	2.44 (1.039)	2.12 (0.968)	P< 0.01

Rejections based on contact (mixing) and ritualization/repetition

The next eating behavior evaluated was contact or mixing of foods. As indicated in the Table 5, there is significant differences on *"I almost always refuse foods that have things in them" "I almost always refuse foods with sauces/ gravy on them"* and *"I almost always reject foods if there is something I can't see in them" with exception on the lumpiness of foods, "I almost always reject foods with "lumps"*.

Table 5 Rejection of food based on contact (mixing) and ritualization/ repetition

Rejection of food based Contact (Mixing)			
Response Factors	Picky Eaters Mean (SD) (N = 235)	Non-Picky Eaters Mean (SD) (N = 168)	*Significance Level*
I almost always reject foods with "lumps" in them (for example, a sauce with pieces in it or a stew), even if they are supposed to be that way (so this does not mean lumpy oatmeal or gravy).	2.48 (0.996)	2.29 (1.067)	NS
I almost always refuse foods that have "things" in them (ie. a cookie with raisins in it, a brownie with nuts in it).	2.37 (1.140)	2.03 (1.072)	P< 0.01
I almost always refuse foods with sauces/ gravy on them (ie. pasta with tomato sauce).	1.91 (0.942)	1.71 (0.876)	P< 0.05
I almost always reject foods if there is something I can't see in them (ie. filled foods like eggrolls, dumplings, karipap).	1.96 (0.919)	1.65 (0.750)	P< 0.001
Rejection of food based Ritualization/ Repetition			
I almost always prefer to eat with a special person(s), in a special place or with special utensils/dishes.	2.78 (1.242)	2.57 (1.289)	NS
I often eat foods in an unusual order (ie. dessert first before main meal).	2.96 (1.127)	2.98 (1.154)	NS
I eat the same meal for breakfast every day or most days.	3.02 (1.251)	2.93 (1.248)	NS
I eat the same meal for lunch every day or most days.	2.92 (1.204)	2.76 (1.273)	NS
I eat the same meal for supper every day or most	2.72 (1.197)	2.53 (1.181)	NS

days.

Ritualization/ repetition

It is clear from the data in the Table 5, that there is significantly (P< 0.01) different in ritualization or repetition eating behavior among picky and non-picky eaters the example is, *"usually, I will not eat a food if I saw someone else touch it"* indicating that picky eaters are avoid eating a food that has been touch by others. On the other hand, there are no differences between picky and non- picky eaters on "I almost always prefer to eat with a special person(s), in a special place or with special utensils/dishes" *"I often eat foods in an unusual order (i.e. Dessert first before main meal)"*, "I *eat the same meal for breakfast every day or most days"*, *"I eat the same meal for lunch every day or most days"* and *"I eat the same meal for supper every day or most days"*.

Rejection of food based on social, healthy eating and other eating behaviors

According to the data shown in the Table 6, there are significant differences between picky and non- picky eaters on *"I often miss meals because I am preoccupied or busy and forget to eat."*, *"Enjoying food is one of the most important pleasures in my life."*, *"I prefer to leave a clean plate"* and *"when I am invited to dinner, I worry that there may be nothing that I can eat"*. Eating behavior may also include the nutrition factors of food as one of the major influence on food choice. However, there was no difference between the respondents of both the groups assessed Table 6. Similarly, *Other Eating Behavior* among picky and non-picky eaters was not different as well.

DISCUSSION

This study attempts to present an overview of the extent and pattern of eating behavior among university students aged 18 - 25 years. From the aforementioned results it appears that alarmingly higher numbers (58 %) of university students have picky eating behavior. Similar observations have been recorded by other authors elsewhere in online surveys on adult age 18 years and above (Wildes *et al*., 2012). Similarly, among children age 7 -12 years 59.3 % picky eaters possess picky eating behavior (Xue, *et al*., 2015), yet another study reports 49.6 % children have picky eating behavior (Goh & Jacob 2012). These studies, including ours suggest that picky eating behavior among children can be prolonged to adulthood. It is believed to be passed on from parents to children (Palfreyman, Haycraft & Meyer, 2015). Similar to another study the present study data reveals that male and female are equally possessing picky eating behavior (Loh *et al*. (2013). The acquisition of picky eating behavior among children takes place with the progression of age and the older age group tend to be more picky then younger (Goh & Jacob, 2012; Mascola, Bryson, & Agras, 2011).

There were differences on the eating habits of narrow range, neophobia, sensory rejection, contact or mixing, ritualization or repetition, interest in food or social eating and

healthy eating between picky and non-picky eaters in this study. Firstly, there was significant difference on narrow range food choice where picky eaters avoid more chicken, vegetables, milk and grains than non-picky eaters. Kauer, *et al*., (2015) also reported that people with picky eating behavior consume fewer range of foods and tend to avoid at least one food group.

Table 6: Rejection of food based on Social, Healthy Eating and Other Eating Behaviors

Rejection of food based on Social Eating Behavior			
Response Factors	Picky Eaters Mean (SD) (N = 235)	Non-Picky Eaters Mean (SD) (N = 168)	*Significance Level*
I look forward a lot to eating.	3.93 (1.023)	4.08 (1.029)	NS
I often miss meals because I am preoccupied or busy and forget to eat.	2.99 (1.165)	2.78 (1.252)	P< 0.05
When I go out, my activities often include food as a central focus.	3.76 (1.027)	3.90 (1.037)	NS
Enjoying food is one of the most important pleasures in my life.	4.18 (0.869)	4.43 (0.757)	P< 0.05
I prefer to leave a clean plate.	4.02 (0.945)	4.52 (0.750)	P< 0.001
When I am invited to dinner, I worry that there may be nothing that I can eat.	2.74 (1.316)	2.42 (1.381)	P< 0.05
I have fond memories of family food occasions.	3.69 (1.050)	3.81 (1.100)	NS
My memories of meals with my family when I was a child include a lot of tension about what or how much I was eating.	2.56 (1.140)	2.39 (1.181)	NS
Rejection of food based on Healthy Eating Behavior			
I am a healthy eater.	3.27 (0.928)	3.29 (0.958)	NS
I prefer to eat "health food."	3.39 (0.972)	3.49 (0.960)	NS
I usually choose low- or no-fat foods over the full-fat version.	3.03 (1.040)	3.04 (1.014)	NS
Rejection of food based on Other Eating Behaviors		(Table Contd……)	
My choice of foods is influenced by religious practices (i.e. pork, beef).	4.46 (0.976)	4.53 (0.875)	NS
My choice of foods is influenced by nutritional or health concerns (i.e. low-salt diet).	3.46 (0.992)	3.57 (0.978)	NS

My choice of foods is influenced by ethical considerations (i.e. vegetarian diet).	2.86 (1.097)	2.75 (1.035)	NS
I have food allergies or medically imposed dietary restrictions.	2.28 (1.341)	2.24 (1.393)	NS
I am often on a diet to lose weight.	2.63 (1.286)	2.63 (1.306)	NS

College students in Malaysia have higher prevalence of underweight nutrient deficiency problems Abdull, *et al*., (2012). In this case, it can be suspected that this pattern might be from the deficiency of carbohydrates and protein food groups as students who adapted picky eating behavior tend to avoid certain food components. However, further studies are needed to assess the Body Mass Index (BMI) parallel to food neophobia of this group to support this idea.

Food neophobia or rejection of new food is one of the characteristics of picky eating behavior. This study showed that students with picky eating habits were more neophobic where they have significant refusal to try new food and uninterested to try new and wide variety of foods. This eating pattern also mentioned by Muhammad, et al., (2015) in their study on food neophobia scenario among college students in Malaysia. This study also reported that picky eaters more strongly to reject food based on texture and appearance of the foods rather than its taste. Kauer, *et al*., (2015) state that adult picky eaters tend to avoid foods that were "slimy or slippery" and with particular colors. The texture rejection showed a contra result to this study which suggested that picky eaters were more likely to avoid gelatinous and very chewy foods. This might be due to the demographic and cultural differences among these two studies. Similarly, color plays the main role in food rejection in adults with picky eating behavior.

Furthermore, picky eaters were significantly more likely to reject foods with the presence of things in them, sauce or gravy, unseen things in the foods and also if the food has been touched by others. Kauer *et al*. (2015) also reported the same sort of avoidance among adult picky eaters. Eating is an important aspect in socializing both for university students and other adults populations. This study showed that students with this behavior were strongly worried and opt not to eat anything when eating out. For such students, eating is not a pleasurable thing and prefer to leave an uncleansed plate. This is contradictory to the finding of Kauer, *et al*., (2015), who report that eating was pleasurable thing for both picky and non-picky eaters. Picky eating behavior might give impact to the social status of a person. Wildes *et al.* (2012) mentioned that picky eating group was more prone to develop social anxiety related to eating. Our study has several strengths including a large sample and usage of Likert-type scales to classify picky eaters as compared to True or False format of the selection item in determining picky eaters. However, there are some limitations including, the research data were collected using online survey with low cost and online surveys may lead to poor reliability due to the incidence of multiple responses and risk of technical problem (Weber & Bradley, 2006). Current study only provides a population with almost similar socio-economy status as college students.

Furthermore the authors were unable to directly access their health problem identifications including BMI and psychological impairment related to picky eating.

Adults with picky eating trait without high symptoms of eating disorder were more likely to have BMI less than 18.5 kg/m^{2,} which fall under underweight category (Wildes, *et al*., 2012). This assessment of BMI among participants might be correlated with picky eating behavior and BMI status as picky eaters may experience undesired weight loss due to their selective diets. In addition, picky eating behavior and Avoidant/Restrictive Food Intake Disorder (ARFID) are likely to be related as selective eating which become one of the criteria for ARFID. Having that shortcomings it is quick in response time, saved cost with better sense of anonymity for the respondents. The authors took a step of precaution prior collection of data to reduce bias by recording their matric numbers in order to evade the recurrence of repetitive respondents. This study may be further carried out on cognitive-behavioral approach which includes relaxation training, continuous positive imagining and exposure, reconstruction of cognitive for food neophobia among adults (Marcontell, *et al*.,2003). Apart from that, the Satter Eating Competence Model (ecSatter) introduced by Satter (2007) can also be used for the improvement of food pickiness. There is need for university students to be educated on healthy food habits (Abdul, et al., 2015). Healthy food habits are crucial since food neophobia and pickiness negatively influence healthy consumption of food (Galloway & Lee, 2003) both in male and males (Gan, *et al*.,2011) .

CONCLUSION

The present study revealed that picky eating behavior exists at alarmingly higher rate (58%) among the university students which need to be addressed.

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