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ARE MALAYSIANS NUTS ABOUT NUTS?: THEORY OF PLANNED BEHAVIOR PERSPECTIVE

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Introduction

Nuts have been a staple part of mankind's diet since pre-agricultural period (Eaton, Konner & Shostak, 1988). Except for food value in many cultures, the history of nuts have had symbolism roles (Salas-Salvadó, Casas-Agustench & Salas-Huetos, 2011). Many historical evidence confirm nuts were used as medicine to treat or prevent diseases during past civilizations (Salas-Salvadó *et al*., 2011). In the modern age, nuts still keep its position as a commodity with a wide range of usage. In western omnivorous diet, they used nuts mostly for snacking or as ingredients to savory and sweet dishes. Nuts also provide a big portion of the necessary source of protein and other nutrients for vegetarians. Nuts are usually eaten in different forms; raw, salted, roasted or buttered. Countries following the Mediterranean diet usually consume nuts two times more than those following the American diet (Sabaté, 1993). Findings by Sabate (1993) indicate vegetarians and health conscious people usually consume more nuts than their counterparts.

Nuts are currently part of many dietary guidelines due to its health benefits and food values (Haddad, Sabaté & Whitten, 1999). The US food and drug administration in 2004 issued a health claim for nuts and nut-containing products due to a scientifically proven connection found between nut consumption and decrease in heart diseases (Food & Administration, 2003). In recent years, the food industry has moved towards a more customer-oriented approach and provide answers to signals from consumers, who are now considered as a main part in the food supply chain (Lowe, Phillipson & Lee, 2008). These days, diet composition is affected by many socio-economic factors. Some of the most influential factors are culture, preference, price, social and health concerns, availability, convenience and environmental factors (Gerbens-Leenes, Nonhebel & Ivens, 2002; McGill, 2009). Health and nutritional perception strongly influence the behavior of

people in choosing foods. People do not only choose based on the basic nutritional contents, but they also choose based on images and ideas as well (Casey, 2009).

Influence on eating behavior can be categorized into two broad categories: individual and environmental influence. Individual influence means the influence on eating behavior such as belief, attitude, self-efficacy and lifestyle (Neumark-Sztainer, Story, Hannan, Perry & Irving, 2002). Environmental influence refer to the physical environment such as family, peers and availability of such food (Berg, Jonsson, Conner & Lissner, 2002; Betoret, Betoret, Vidal & Fito, 2011). Developing a new market for a product is an expensive process which requires detailed knowledge about the product and consumers of the product (Betoret *et al*., 2011). Food choices is highly influenced by consumption context, whereby as a result both consumers and marketers pay more and more attention to it (Meiselman, Frewer & Trijp, 2006). A better understanding of a product and its consumer profile may signify the potential to penetrate to snack's market. Awareness of consumer's perception and attitude toward food attributes can help front office personnels to fulfill the tangible aspect.

One of the key motives for fruit consumption is healthiness (Sobal, Bisogni, Devine & Jastran, 2006). According to Lennernäs *et al*. (1997), eating healthy is the most important factor for choosing food among European citizens. But other motives and barriers, such as knowledge, price and convenience have a significant role in the choice made to consume fresh fruits (Harker, Gunson & Jaeger, 2003). Lack of convenience, having a limited durability or a short shelf-life, are barriers for fresh fruits consumption (Kaufman, Lane & Lindquist, 1991). It is necessary for food industries to respond to this faster societal pace (Jabs & Devine, 2006). Although extensive research has been conducted on the attitude and belief towards nutritional benefits, barriers in consumption, and knowledge of consumers regarding fresh fruits, little attention has been paid towards nuts. The awareness of the health benefits of nuts is unclear among Malaysian consumers especially young adults. Barriers toward eating nuts which are prevalent among Malaysian young adults are also unknown. This study use a modified construct of the Theory of Planned Behavior as its theoretical framework to examine and understand nut- eating behavior in young adults. The proposed variables are based on the Theory of Planned Behavior, including attitude towards nut-eating behavior, subjective norm for nut eating, perceived behavioral control towards nut eating and behavioral intention to eat nuts which are chosen to predict young adult's healthy eating behavior. This study focuses on young adults due to their lack of awareness on health benefits of nuts compared to the elderly. Apart from lack of awareness about health related to the intake of nuts, young adults also lack

knowledge about the advantages and disadvantages of consuming nuts.

Objective

The essential objectives of this study is to measure nutritional and health perceptions of Malaysian young adults toward nut intake. Additionally, this study is to determine the predictive ability of attitude, subjective norm, and perceived behavioral control on behavioral intention in consumption of nuts among young adults.

Literature Review

Studies on benefits of nut intake

Nuts are known as fatty foods, and probably this is why they were recommended with a great deal of caution. American Heart Association (1991) warned that nuts are fatty food. However, a lot of research are being conducted on the effects of nuts on health. Studies have compared between the effects of diets which are nut rich or a low fat diet or a Mediterranean diet among different population groups. One example is a study by Fraser *et al.* (1992) who looked into the relationship between chronic diseases, like Coronary Heart Diseases (CHD), and food consumption, which included nut intake. It was found that individuals who consume nuts more than five times a week compared to those who take less than once a week, have a decrease of 48% in definite non-fatal myocardial infarction (MI) and 38% decrease in definite fatal CHD (Fraser *et al*., 1992). A similar study by Albert *et al*. (2002) found that there is a 30% decrease in fatal CHD risk among men who take nuts more than twice a week compared to them who take it less than once in a month. Jiang *et al*. (2002) found that consumption of nuts and peanut butter was inversely associated with the risk of type 2 diabetes. This was a study conducted to see the relationship between nut intake and the developing of type 2 diabetes. There was a decrease of 27% risk when nuts were consumed more than five times a week and a decrease by 21% when peanut butter was consumed more than five times a week, in comparison to those who never or almost never consume nuts. Similarly, the study by Fraser *et al*. (1992) and Kushi *et al*. (1996) indicates nut consumption can lead to a decrease in cardiovascular disease (CVD) and type 2 diabetes. There was another study conducted by Djoussé, Rudich & Gaziano (2009) to assess the impact of nut intake on hypertension risk, and it was found that less risk can be achieved for those who consume nuts frequently. Since discovering the potential health benefits of nuts in 2002, the International Tree Nut Council Nutrition Research and Education Foundation (INC NREF) has placed a request to the United States Food and Drug Administration (FDA) to qualify

tree nuts and peanuts for a health claim that could be used on food labels. FDA has placed a health claim which reads: Scientific evidence suggests but does not prove that eating 1.5 ounces per day of most nuts as part of a diet low in saturated fat and cholesterol may reduce the risk of heart disease (FDA, 2009; The International Tree Nut Council Nutrition Research & Education Foundation, 2003).

Effect of nut intake on cardiovascular disease risk factors

Reports have shown that cardiovascular disease (CVD) is the leading cause of death in the US (Albert *et al*., 2002). However, there are studies which shows a reduced risk of cardiovascular disease (CVD) and coronary heart disease (CHD) through intake of nuts, whereby frequent consumption has resulted in low risk factors for CVD such as cholesterol level, blood lipid level, inflammation and reduction in blood cholesterol concentrations (Fraser *et al*., 1992; Alexiadou & Katsilambros, 2011). Malaysia is a country in which cardiovascular disease (CVD) is a major disease, with the increase from 7.5% in 1965 to 27.8% in 1997, with doubled mortality rates between 1970 and 1996, from 24.1 to 54.8 per 100,000 inhabitants. This is a worrying rate, with data showing that admissions into government hospitals have increased from 278 per 100,000 inhabitants in 1985 to 493 per 100,000 in 1996 (Noor, 2002). As a consequence, the Ministry of Health in Malaysia has given emphasis on awareness campaigns to promote a healthy living lifestyle, whereby in May 1991, its first thematic campaign of Healthy Lifestyle Campaign was launched (ES Tee, 1999). Despite having health benefits, nuts are known as energy dense food which can cause weight gain and obesity (Mendoza, Drewnowski, Cheadle & Christakis, 2006). As a result, the consumption of nuts might be affected because of its weight gaining characteristic and other possible effects that can negate the beneficial effects of nuts. These effects have created a public assumption of nuts as fattening and thus they neglect the advice to consume nuts regularly as a way of reducing CVD risk (Webb & Dear, 1996). There are studies showing that regular nut consumers tend to have leaner bodies than those who don‘t consume nuts (Tey, Brown, Gray, Chisholm & Delahunty, 2011). Besides, some studies which have focused on the relation with nut consumption and weight gain or loss, have found that those who practice nut-enriched diet experienced greater weight loss and greater improvement in CVD risk factors compared with a low-fat diet, a complex carbohydrate diet or an isocaloric diet without nuts (Li *et al*., 2010). Besides, Casas-Agustench *et al*. (2011) stated that there are some clinical studies which failed to show an increase in body weight with regular consumption of different nuts. In fact, according to Tey (2011), people who consume nuts either daily or more than twice a week has either no possibility or less possibility of weight gain. Obesity among youth is another health problem that is increasing rapidly all across the globe

(Doll, Paccaud, Bovet, Burnier & Wietlisbach, 2002; Tappy & Lê, 2010). Tappy & Le (2010) has concluded that it is caused by a continuing imbalance between energy intake and disbursement. Obesity related to adults is a result of childhood and adolescence obesity (Goran, 2001). The benefits of nut intake such as pistachios has shown an adverse effect to weight gain as well as improving one's diet quality (Tey *et al*., 2011).

The link between cholesterol level and impact of nut intake can be summarized through research by Chisholm *et al*. (2005), Griel *et al*. (2008) and Gebauer *et al*. (2008). Their studies found that intake of nuts can lead to decrease in cholesterol level due to the unsaturated fatty acid found in nuts, such as on pistachios. There is an inverse relationship between intake of pistachios and risks of CVD. Another field of research such as by Rogers *et al*. (2011) stated that hypertension is a major cause which leads to CVD, whereby it affects almost 1 billion individuals worldwide and causes the death of 7.6 million people (Martinez-Lapiscina *et al.*, 2010). However, the link between nut intake and hypertension is found to be of a reverse relationship by Djousse *et al*. (2009). Besides, Jiang *et al*. (2006) too have found that nuts have anti-inflammatory properties, which can help reduce vascular inflammation.

Snack trend

Snacking is defined as the consumption of any food item that is not a meal (Block, Gillespie, Rosenbaum & Jenson, 2000). Synonymous with snack food are savory snacks, potato chips, snack nuts and popcorn. Some researchers divided snacks into two wide groups; healthy and unhealthy snacks. The consumption of snack food is popular in countries such as the United States (80%), followed by Germany (74%), United Kingdom (69%) and Japan (66%) (Euromonitor, 2010). A study by Hassan and Al-Abbad (2011) on the trend of snack eating in Saudi Arabia, discovered that snack eating is a habit which occurs between 1 to 4 times a day. 69.8% of the subjects were children and adolescence, where most (44.3%) had only one to two main meals a day, indicating that snack eating is a developing trend in most communities. In 2012, Malaysia's snack industries had hit the sales figure of RM200 million (US$66 million), in a report released by FAMA, with chips sharing a staggering RM102.1 million (34 million USD) of the market.

Barriers in consumption

There are studies that support the relationship between barriers and behavior (Dittus, Hillers & Beerman, 1995). Ziebland *et al*. (1998) stated factors

influencing an individual's diet includes availability, cost and time, which can be seen as external factors. Cost can be seen as a factor which cause barriers to people of lower income toward healthy eating, whereby high costs of fruits and vegetables can be a hindrance (Reicks, Randall & Haynes, 1994). Besides, other factors which determine an individual's fruit and vegetable consumption include individual's self-efficacy, the influence of others, and the availability (Brug *et al.,* 1995). Reicks *et al.* (1994) stated that it is important to like the taste of fruits and vegetables (internal factors). Consumers need to accept the ingredients or content in food, which is linked to their knowledge and its effects (Jesionkowska, Sijtsema, Konopacka & Symoneaux, 2009). Reasons identified as barriers of healthy eating, found in a study by Lopez-Azpiazu *et al.* (1999) among 1009 Spanish adults, over the age of 15 were irregular work hours, willpower, and unappealing food, especially among the younger age group. Besides, other factors include high cost and high spoilage rate of fruits and vegetables (Yeh *et al.*, 2008). For the purpose of this research, we choose some of the most common barriers in consumption of fruits to be elaborated in the case of nuts in Malaysia.

Conceptual Framework and Hypotheses Development

The conceptual framework of the study is designed based on the previous literature review. Indeed, the modified Theory of Planned Behavior (Ajzen, 1991) was selected as the conceptual framework of this study. The constructs of the TPB (ATT, SN, PBC, and INT) are said to account for all factors that could possibly influence the participation in any behavior (Ajzen, 1991). This research applied TPB to evaluate Malaysian young adult's behavioral intention toward nuts and dried fruits consumption. Consistent with this literature, the current study propose the following hypothesis:

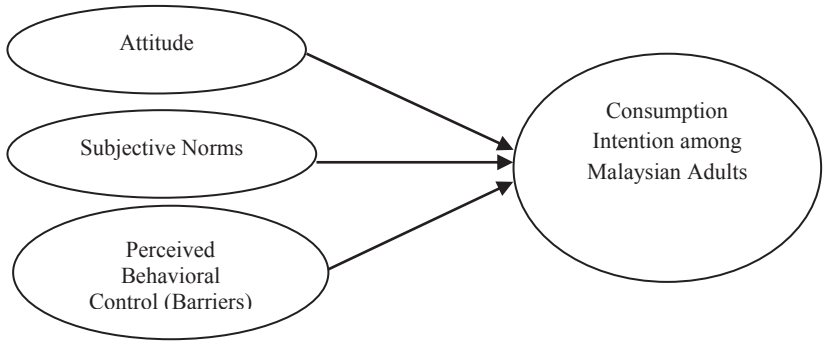


Figure 1: Theoretical Framework

Methodology

This survey was conducted at Universiti Kebangsaan Malaysia (UKM). The questionnaires were distributed to a total of 160 Malaysian respondents who have consumed nuts and dried fruits at least once in their lifetime. Respondents were chosen conveniently among UKM students. Finally, 147 respondents between 18 to 35 years old in UKM were selected.

Instrument

The questionnaire consists of 43 questions. It includes, the questions on attitude towards nut eating behavior, subjective norms for nut eating behavior, and perceived behavioral control to eat nuts. Seventeen items under the construct of attitude were measured with a scale from Pawlak *et al.* (2009). The items for the independent variables (i.e. attitude, subjective norms, perceived behavioral control and intention) were also developed from the study of Pawlak *et al*. (2009). All items were modified to suit for this research. All questions used a five-point Likert scale (1 indicating "strongly agree" to 5 indicating "strongly disagree").

Test of reliability, validity and identification of factors

A reliability test was performed with regard to all variables using SPSS statistics software version 21. A pilot test was conducted before the actual survey to ensure consistency between all dimensions of variables. The pilot test was conducted among 37 respondents and in two different steps between independent variables and dependent variables.

Reliability test was also done to test the consistency of respondent's answers. Firstly, reliability test was run to measure consistency of attitude. The result from reliability test conducted for attitude is 0.763 which means it is reliable. The second variable is subjective norms. Reliability test was also performed for this variable. The value of Cronbach's Alpha for the variable of subjective norms is 0.773, which asserts that the test for this variable is also reliable because it is more than 0.7. The third variable is perceived behavioral control (Barriers). Likewise, reliability test was run to test this variable, and accordingly the value of Cronbach's Alpha for perceived behavioral control is 0.753 which means that it is reliable since the Cronbach's Alpha is more than 0.7. The last variable tested is behavioral intention. The value of Cronbach's Alpha is 0.887 which means that it is reliable since the Cronbach's Alpha is much higher than 0.7. Lastly, the results show that behavioral intention with Cronbach's Alpha of 0.887 is the most reliable variable in this research and perceived behavioral control with Cronbach's

Alpha of 0.753 is the least reliable variable; however, all the variables have high Cronbach's Alpha values and as a result, all of them are highly reliable.

Results

Profile of respondents

Descriptive statistics were derived from the demographic part of the questionnaire which includes 11 questions. Respondents' profile such as gender, age, educational level, income, and ethnic was declared by the frequency analysis (Table 1). Females consisted of the majority of population with 94 respondents (63.9%) outnumbering the 53 male participants (36.1%). The population target of research was between the age group of 18 to 35. To make it more specific, the researcher divided this age group into two sub groups which include 18 to 24 consists of mostly bachelor students and 25 to 35 consists of mostly master or Ph.D students. Ninety three participants (63.3%) are between 18 to 24 years old and fifty four (36.7%) are between 25 to 35. The third question elicits ethnicity of the participants. Malays comprise of the biggest portion of population with 113 respondents (around 80%) and Chinese and Indians with 28 and 8 respondents, respectively. Three participants mention their race as Iban and Bidayuh.

Analysis of income of respondents indicates that most of them (43.5%) have income less than RM2000 per month or do not have an income at all. The answers for this category were divided into four categories. The first category was for respondents whose annual income less than RM 2000 (43.5%). The second category was for respondents whose monthly salary or income more than RM 2000 and less than RM 5000 (32.7%). The third category was for respondents whose monthly income between RM 5000 and RM 10,000 (14.3%). The fourth category was intended for respondents with salary higher than RM 10,000 (9.5%). Education level was another demographic question posed in the questionnaire. It was divided into 5 different levels. Interestingly, 42 participants (28.6%) were master or Ph.D students which is quite highly rated while only 2 of them (1.4%) had less than high school education. Most of the participants graduated from college (32.7%) and the rest have some college degree (19.7%) or graduated from high school (17.7%).

Table 1: Profile of Respondents

Characteristics		Frequency	%
Gender	Male	53	36.1
	Female	94	63.9
Age	18-24 years old	93	63.3
	25-35 years old	54	36.7
Ethnic	Malay	113	76.9
	Chinese	28	19.0
	Indian	6	4.1
Education Level	Less than high school	2	1.4
	Graduated from high school	26	17.7
	Some college	29	19.7
	Graduated from college	48	32.7
	Master or Ph.D	42	28.6
Annual Income	Less than RM2000	64	43.5
	RM2,000-RM5,000	48	32.7
	RM5,000-RM10,000	21	14.3
	RM10,000 or more	14	9.5

More than half of the participants (60.0%) believed they consumed a healthy diet and the rest of the participants believe they do not practice a healthy diet. However, only 23.8 percent indicate they ate nuts 1-2 times a week, as shown in Table 2. This is lower than the findings by London (2011) who found 35.3% of American consume nuts 1-2 times a week. Around 1.4 percent of participants do not eat nuts and dried fruits at all, while most participants (45.6%) eat nuts 1-2 times a month.

Table 2: Frequency in Usage

No.	How often eat nut	Frequency	%
1.	Never	2	1.4
2.	Less than once a month	30	20.4
3.	1-2 times an month	67	45.6
4.	Once a week	12	8.2
5.	1-2 times a week	35	23.8
Total		147	100.0

Findings in Table 3 shows that participants are more likely to consume roasted nuts (34.7%) or salted nuts (20.4%). Around 15.0 percent prefer nuts in the form of nut butter. Most individuals prefer peanuts, almonds, dates and raisins.

Table 3: Most Like to Eat

No.	Most Like to Eat in	Frequency	%
1.	Raw	10	6.8
2.	Salted	30	20.4
3.	Roasted	51	34.7
4.	As Nut Butter	22	15.0
5.	None	4	2.7
Total		117	79.6

Descriptive statistics of the study variables

The following is a description of the major variables in this study: attitude toward health benefits of nuts, subjective norm for eating nuts, perceived behavioural control and behavioural intention toward eating nuts. Mean, frequency and standard deviation are presented in the following sections to illustrate the descriptive statistics of the study variables.

Descriptive statistics of positive attitude toward eating nuts

Participants answer to all questions regarding attitude toward health benefits of nuts. The lowest mean belong to 'nuts are high in nutrients' and 'nuts are high in protein' with 2.60 and 2.63 respectively, which means these two beliefs are more accepted by young adults. Conversely, 'eating nuts help to look young' received the highest mean which means it received the highest level of disagree compared to other dimensions. 'Nuts are high in calories' also surprisingly received a mean of 3.28 which means more than half of the participants disagree with this. About half of the participants strongly agree or agree about these three characteristic of nuts; nuts are nutrient, nuts are high in protein and nuts are healthy. Around 38.8% of participants believe nuts are high in dietary fiber. Approximately 43.0 percent of participants didn't know about the Omega 3 characteristic of nuts. Slightly more than one-third of the respondents were unaware that frequent nut intake decreases the risk for heart attacks (32.6%) and about 32.0 percent disagreed that nuts could perform these effects. About 36.7 percent were unaware of the hypocholesterolemic effects of nuts and an additional 36.7% disagreed that nuts exhibit such effects. Around 40.0 percent of participants didn't know about the prevention characteristic of nuts for diabetes and around 30.0 percent disagree that nuts could perform these effects. In converse with fresh fruits and vegetables, just 18.3 percent of participants eat nuts to look young and 43.6 percent of participants disagree that eating nuts causes consumers to look young. 'Eating nuts help to look young' received the lowest degree of acceptance (18.0%), which is the opposite with the consumption of fresh

fruits and vegetables which consumers view as a way to keep young. Just around 33.3 percent of participants believe by eating nuts, means they take better care of their bodies. At least one third of participants (30.0%) neither agree nor disagree with all 12 positive sentences toward nuts and dried fruits which can be interpreted as lack of knowledge about nuts health benefits.

Descriptive statistics of negative attitude towards eating nuts

The rate of negative attitude toward nuts is quite high. Nearly 52.3 percent of the participants thought nuts were high in fat; while only 22.5 percent disagree with this. While approximately 41.5 percent of participants believe nuts are salty, around 34.0 percent neither agree nor disagree with this. Around 42.2 percent of participants believe nuts will cause an increase in cholesterol and just 23.8 percent disagree with this. Although scientific findings do not indicate that eating nuts will cause weight gain (Bes-Rastrollo *et al*., 2007; Sabate, 2003). Just 18.4 percent of participants do not believe nuts don‘t cause weight gain and around one half of participants believe nuts will cause weight gain. Moreover, almost half of the participants (49.0%) believe nuts cause allergies and just 23.1 percent disagree with this. Between 40 to 50 percent of participants either strongly agree or agree with all five negative attitudinal statements.

Table 4: Frequency of Positive Attitude towards Eating Nuts

	Nuts are healthy		***Nuts are high in nutrients***		***Nuts are high in protein***		***Nuts are filling***		***Nuts are high in calories***		***Nuts are high in dietary fiber***		***Nuts are good source of omega -3 fat***		***Eating nuts help to lower cholesterol level***		***Eating nuts help to lower risk for heart attack***		***Eating nuts help to lower risk for diabetes***		***Eating nuts help to look young***		***Eating nuts help to take better care of my body***	
	Frequency	*Percent*	*Frequency*	*Percent*	*Frequency*	*Percent*	*Frequency*	*Percent*	*Frequency*	*Percent*	*Frequency*	*Percent*	*Frequency*	*Percent*	*Frequency*	*Percent*	*Frequency*	*Percent*	*Frequency*	*Percent*	*Frequency*	*Percent*	*Frequency*	*Percent*
Strongly Agree	20	13.6	20	13.6	22	15.0	10	6.8	5	3.4	16	10.9	13	8.8	15	10.2	19	12.9	14	9.5	4	2.7	10	6.8
Agree	50	34-0	56	38.1	50	34	33	22.4	21	14.3	41	27.9	38	25.9	24	16.3	29	19.7	32	21.8	23	15.6	39	26.5
Neither	46	31.3	42	28.6	40	27.2	54	36.7	59	40.1	56	38.1	63	42.9	54	36.7	52	35.4	57	38.8	56	38.1	46	31.3
Disagree	18	12.2	21	14.3	30	20.4	42	28.6	52	35.4	30	20.4	28	19.0	45	30.6	35	23.8	38	25.9	48	32.7	45	30.6
Strongly Disagree	13	8.8	8	5.4	5	3.4	8	5.4	10	6.8	4	2.7	5	3.4	9	6.1	12	8.2	6	4.1	16	10.9	7	4.8
Total	147	100	147	100	147	100	147	100	147	100	147	100	147	100	147	100	147	100	147	100	147	100	147	100

Table 5: Frequency of Negative Attitude toward Eating Nuts

	High in Fat		*High in Salt*		*Cholesterol Increase*		*Cause Weight Gain*		*Nuts Cause Allergies*	
	Frequency	*Percent*	*Frequency*	*Percent*	*Frequency*	*Percent*	*Frequency*	*Percent*	*Frequency*	*Percent*
Strongly Agree	18	12.2	10	6.8	10	6.8	14	9.5	26	17.7
Agree	59	40.1	5	34.7	52	35.4	56	38.1	46	31.3
Neither	37	25.2	50	34	50	34.0	50	34.0	41	27.9
Disagree	26	17.7	22	15	25	17.0	20	13.6	19	12.9
Strongly Disagree	7	4.8	14	9.5	10	6.8	7	4.8	15	10.2
Total	147	100	147	100	147	100	147	100	147	100

Descriptive analysis of subjective norms toward eating nuts

The influence from 'confirmation by authorities' and 'doctor's recommendation' has the highest rate with a mean of 2.53 and 2.55 respectively to encourage eating nuts. This finding is consistent with previous research. Parents and classmates have the lowest influence with a mean of 2.94. High level of acceptance from doctors and authorities by participants who are mostly students can be linked to their mentality and science orientation.

According to the frequency result from subjective norms, confirmation from authorities has the biggest influence on participants with a percentage of 55.7 percent. After 'confirmation from authorities', recommendation by doctors achieve 53.1 percent and suggestion by parents and classmates achieve approximately 38.1 percent, suggesting quite a big influence. This is consistent with previous findings which confirm doctors as one of the strong subjective norms for changing eating behavior (London, 2012). In a research about consumption of beverage in the US, participants also continuously emphasize the importance of their doctor's advice on their beverage choices, emphasizing the effect of subjective norms on their beverage consumption

(Krzeski, 2011).

Table 6: Frequency of Subjective Norms toward Eating Nuts

	Doctor recommended		*Parents & classmates*		*Authorities confirm*	
	Frequency	*Percent*	*Frequency*	*Percent*	*Frequency*	*Percent*
Strongly Agree	35	23.8	12	8.2	23	15.6
Agree	43	29.3	44	29.9	59	40.1
Neither	34	23.1	46	31.3	36	24.5
Disagree	23	15.6	31	21.1	22	15.0
Strongly Disagree	12	8.2	14	9.5	7	4.8
Total	147	100	147	100	147	100

Descriptive analysis of perceived behavioral control toward eating nuts

At least one third of participants neither agree nor disagree with the 7 barrier statements. The majority (42.9%) of participants strongly disagree or disagree with the barrier statement, 'I would eat nuts on most days of a week if they were in better packaging' and 'Eating nuts on most days of a week would cost me too much money'. Approximately, 46.0 percent of participants indicate they strongly agree or agree with the statement, 'I would eat nuts on most days of a week if they were lower in fat' and 41.5 percent strongly agree or agree with 'eating nuts if they are affordable'. Lack of diversity (flavor and taste) were another serious barrier in consumption of nuts (36.1%). It seems packaging and cost are not strong barriers as compared to being lower in fat and being affordable.

Table 7: Frequency of Perceived Behavioral Control toward Eating Nuts

	Cost Too Much Money		*Available in Grocery Store*		*Affordable*		*More Flavor*		*Fat is lower*		*In Better Packaging*		*Eat Too Much Fat*	
	Frequency	*Percent*	*Frequency*	*Percent*	*Frequency*	*Percent*	*Frequency*	*Percent*	*Frequency*	*Percent*	*Frequency*	*Percent*	*Frequency*	*Percent*
Strongly Agree	17	11.6	10	6.8	22	15.0	11	7.5	19	12.9	13	8.8	9	6.1
Agree	30	20.4	34	23.1	39	26.5	42	28.6	48	32.7	26	17.7	24	16.3
Neither	43	29.3	56	38.1	55	37.4	43	29.3	52	35.4	45	30.6	59	40.1
Disagree	43	29.3	38	25.9	26	17.7	45	30.6	27	18.4	43	29.3	42	28.6
Strongly Disagree	14	9.5	9	6.1	5	3.4	6	4.1	1	.7	20	13.6	13	8.8
Total	147	100	147	100	147	100	147	100	147	100	147	100	147	100

Affordability, lack of variety and cost were found to be the most important barriers for eating nuts. It seems respondents are more worried about the health aspect of nuts and dried fruits rather than its packaging and cost. Again, the high number of neither agree nor disagree can be interpreted as lack of knowledge and experience regarding these products. Affordability is also a barrier for eating other healthy items such as fruits and vegetables (Pawlak *et al*., 2009). Almost 60% of respondents either strongly agree or agree that they would eat nuts if they were affordable. These are the same barriers in consumption of fruits and vegetables in line with earlier studies (Betts *et al*., 1995; Brug, Debie, van Assema & Weijts, 1995).

Discussions and Recommendations

Nut consumption among participants is found to be low, around 46.0 percent of participants' intake of nuts is just once or two times per month. Only about 23.8 percent of the participants indicate they consume nuts 1-2 times a week. The majority of the participants' intake was less frequent. The recommended level of nut intake is 1.5 ounces on most days in a week, however, majority of participants took less. However, 60.0 percent of the participants believed they have a healthy diet.

Nuts are perceived as food with high fat and calorie content, which can be one of the reason for the low intake of nuts. However not many are aware of the beneficial impact of nuts on CVD and diabetes prevention. Educating the public on the benefits of nuts and the fiber content found in nuts, is essential. Results of this study indicate that participants are not aware of the benefits of nuts. The study by Pawlak *et al.* (2009) also found a large number of participants of WIC were not aware of the scientific findings regarding health benefits of frequent nut consumption. Therefore, education and advice from doctors and healthcare professionals to the public are needed to increase public awareness on the benefits of nut consumption on CVD and diabetes.

Participants seem to strongly agree or agree that if they receive confirmation from the authorities or doctors, they would have consumed nuts on most days. Almost 50.0 percent of the participants indicate that they would follow doctors' advice on nut consumption, therefore giving an indication that doctor's dietary advice is effective in improving the consumption of nuts. The findings suggest that physicians can influence student's behavior to consume nuts and have a positive impact from the use of these products.

It has also been found that affordability is the largest barrier in nuts and dried fruits consumption. 41.5 percent indicated affordability as the barrier and 52.3 percent indicated that fat found in nuts (nutrient content) as the barrier for nut consumption.

This study conclude that attitude of young adults toward nut consumption is negative. This is because more young adults believe that nut consumption can increase cholesterol and body weight. Therefore, young adults should get accurate information relating to nut consumption. Without the right information, wise decisions related to consumption of nuts cannot be made. Further results also showed that experts or people who have authority can profoundly influence young adults in their nut consumption. Thus, young adults should consult a doctor or people who have authority, other than their parents prior to nut consumption. The study found that packaging and cost were not the major barriers as compared to lack of variety and cost. Young adults see more barriers in nut consumption in terms of health. There will no longer be any barriers to young adults if they have sufficient knowledge pertaining to the benefits of nut consumption.

In TPB theory, attitude, subjective norms and barriers are alleged to influence the consumption intention among young adults. The current study found that the attitude of young adults toward nut consumption was negative because they thought that nut consumption may increase their cholesterol and body weight. The results of the study for subjective norms indicate that subjective norms do influence nut consumption for young adults as well as the barriers which also affect the consumption of nuts, especially barriers for eating. This is because young adults are more worried about the health aspect of nuts and dried fruits rather than the packaging and cost.

This research also found that most respondents do not have adequate knowledge on the benefits of nuts especially on the aspects related to heart attack, diabetes and cholesterol. Despite having past research showing that nuts are in fact a healthy food, Malaysian young adults seem to be unaware of the health benefits of nuts. One possible explanation for the significant effect of attitude on intention to eat nuts in this study is that the young adults in this study put value on the positive outcome of eating nuts. They believe that eating nuts provide them with many health benefits and they perceive nuts and dried fruits as healthy food which are high in protein and high in nutrients. Armitage and Conner (2001) explained the issue of measurement of subjective norm for intention to healthy eating behavior. They believed the weak performance of subjective norm in predicting intention was because of the usage of single-item measure. However in this study, subjective norm for eating nuts was assessed via 3 items: doctors, authorities and classmates and parents. Perhaps incorrect combination items were chosen to measure the subjective norms. Another explanation for this may be the psychological characteristic of this age group who want to be independent and usually follow their own preferences.

Limitations and future directions

This research is solely based on university students, therefore the findings cannot be generalized to other young adults of similar age who are employed. They may have different determinants or factors influencing their consumption of nuts. Therefore, future research should be conducted among the young adults and university students of different lifestyle to enable us to understand their consumption of nuts.

Conclusion

The findings of this study suggest that the diet among young adults in Malaysia needs improvement, especially in terms if their snack choices. Snack foods which are palatable, inexpensive and low in calories as well as fat, highly densed in nutrients should be made available for the consumption of young adults. Nuts have the potential to be used as a healthy snack for all age groups especially for young adults. Parents, teachers and health professionals play important roles in creating a positive attitude toward eating nuts as healthy snacks, since many studies have found attitude to be the strongest predictor of intention. Public knowledge, especially among young adults regarding the benefits of nuts especially on diabetes and CVD should be increased and efforts should be made to educate public about the positive benefits of nut intake. One effective strategy is to encourage positive attitude by providing new and various nutritional information about nuts. Individual awareness of the health benefits of nut consumption can be enhanced through a combination of strategies to create awareness as well as tackling perceived barriers. Thus, it is hoped that these strategies can have a positive impact to young adults on the consumption of nuts as a healthy snack.

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