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Associations between Personality Traits and Body Weight Status with Energy Intake of Adolescents in Hulu Langat District, Malaysia

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ABSTRACT

Introduction: Personality traits are divided into five basic dimensions: extraversion, neuroticism, conscientiousness, agreeableness and openness. These influence our attitudes and behaviours. Studies show that differences in personality traits may influence the dietary intake. **Methods**: A cross-sectional study aimed at determining the association between personality traits and body weight status with energy intake was conducted among adolescents in Hulu Langat district of Selangor. Height, weight and waist circumference were measured and respondents completed a pre-tested self-administered questionnaire. Personality traits were assessed using the Malay version of USM Personality (USMaP-i). A single 24-h dietary recall was used to assess dietary intake. **Results:** A total of 430 adolescents aged 13-16 years (46% male and 54% female) was recruited. Female respondents tended to be more neurotic and agreeable compared to male respondents. A majority of the respondents (67%) were in the normal weight category, 26.7% were overweight and obese, while 19.0% had a high risk of developing abdominal obesity with a mean waist circumference of 72.65 ± 10.93cm. Males significantly had a higher intake of energy (1425±583 kcal), compared to females (1232±462 kcal). Conscientiousness trait ($r=-0.158$, $p<0.01$), BMI-for-age ($r=-0.147$, $p<0.01$) and waist circumference ($r=-0.108$, $p<0.05$) were inversely related to the energy intake of the respondents. **Conclusion:** Leaner adolescents and individuals with low conscientiousness were significantly consuming more energy than their counterparts. Understanding the personality traits that may regulate caloric intake is essential in order to develop effective interventions towards modifying obesity-inducing eating patterns.

Key words: Adolescent, body weight status, energy intake, obesity, personality traits.

INTRODUCTION

Adolescence covers a transition period from childhood to adulthood which is characterised by initial secondary sexual characteristics development until a person has achieved adult status. This transition is a part of important stages in the life cycle that typically involves intense growth and development (WHO, 2005). In adolescence, nutrition plays an important role, particularly in terms of energy intake requirements due to significant physical changes. The basal metabolic rate typically reduces as we grow, but increases during puberty.

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As puberty triggers a growth spurt, there is a need to increase the nutritional needs which indicate the need for an increase in caloric intake during the growth period. The body needs energy for various tasks such as maintaining body temperature, metabolic activity, supporting growth and performing physical work. At the same time, it is essential to ensure that energy intake does not exceed energy expenditure to prevent over consumption that could lead to obesity and its complications (NCCFN, 2005).

It is our personality traits that distinguish us from other people and make us unique individuals. They are a combination of mental, emotional, social and physical characteristics that predisposes behaviour. Personality is mostly genetically inherited as it remains for life, but it could change depending on the environment and becomes a predictor of our behaviours, thinking and feeling (Muhd Saiful, Ahmad Fuad & Abdul Rahman, 2010). The five dimensions of personality are divided into extraversion, neuroticism, conscientiousness, agreeableness and openness to experience (Goldberg, 1993). People who score highest at extraversion are socialisers who typically enjoy spending time with people and have a keen interest in them. Neurotic individuals tend to experience negative emotions and are more likely to be able to cope with stressful situations. The conscientiousness domain involves purposeful planning and organising to achieve long-term goals and is often associated with intelligence, cautiousness and reliability. However, others may consider them as a perfectionist, workaholic and boring. Agreeableness trait indicates how compatible individuals are with people. They are friendly, more willing to help others, and more likely to adapt to any social situation. Individuals with high openness to the experience trait are more open to new ideas, are imaginative and have a preference for intellectual curiosity (Muhd Saiful *et al.,* 2010)

Each of these traits differ from each other, yet they work in complementary ways. Extraversion has been shown to be correlated with over consumption and obesity among children (Faith *et al.*, 2001). In addition, low conscientiousness has been also reported to be associated with an increased consumption of snacks under stress situations (O'Connor & O'Connor, 2004). Binge eating has been found to be correlated with a high emotional disability and is associated with the neuroticism trait (Izydorczyk, 2012). Since agreeableness includes being compliant, the more agreeable individuals may be more inclined to obey the guidelines for healthy diets while individuals with the openness trait are more likely to consume novel foods and foods that are not readily available (Nicklas *et al.*, 2001).

The epidemic of childhood and adolescent obesity has become one of the major concerns for both the public and researchers. An obese and normal-weight individual may have a different approach to the consumption of energy intake. Obese adolescents are reported to eat less compared to their normal weight counterparts. Overweight individuals are less active than normal-weight individuals, thus, they require fewer calories to maintain energy balance (Chung *et al.*, 2012). In addition, obese people have a tendency to underreport their food intake compared to lean people especially high fat and high carbohydrate food, both of which contribute to calorie intake (Heitmann & Lissner, 1995). An elaborate understanding of factors that may regulate energy intake could provide preliminary evidence and new information on factors related to energy intake among adolescents. Thus, this paper aims to determine the associations between personality traits and body weight status with energy intake among selected adolescents in selected secondary schools in Hulu Langat district, Selangor.

METHODS

A cross-sectional study was conducted among Forms 1, 2 and 4 students aged between 13 to 16 years that were recruited from five secondary schools in the Hulu Langat district in Selangor, Malaysia. The schools were selected using multi-stage cluster sampling using a formula by Levy & Lemeshow (1999). An updated list of secondary schools provided by Pejabat Pendidikan Daerah Hulu Langat was entered into the formula. Based on cluster sampling calculation, five out of 32 available secondary schools in Hulu Langat district were randomly selected for this study. Each school was assigned a specific number ranging from 1 to 32 and five schools were randomly selected by random generator software. One classroom from each of Forms 1, 2 and 4 classes was randomly selected from each school after a discussion with the school administration. Altogether, a total of 520 respondents were recruited, but the final sample consisted of 430 respondents with an overall response rate of 82.7%.

Ethical approval was obtained from the Medical Research Ethics Committee, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia [Ref.: UPM/FPSK/100-9/2-JKEUPM (JPD_Aug (12)04]. Permission to conduct the study was obtained from the Ministry of Education Malaysia, Selangor State Department of Education and District Education Department of Hulu Langat. Both information sheets containing a brief introduction to the study and parent consent forms were distributed to the students a week before data collection day. Only students with parent's consent were eligible to participate in this study.

A self-administered questionnaire consisting of two sections, Section A: socio-demographic background and Section B: personality traits, was used for data collection.

The Questionnaire

Section A: Socio-demographic background
Information on socio-demographic background included sex, ethnicity, date of birth, parental educational level and parental monthly income.

Section B: Personality traits
Personality was assessed using the Malay version of USM Personality Inventory (USMaP-i) that was developed by Muhd Saiful et al. (2010). It has 60 items divided into five domains categorised as extraversion, conscientiousness, agreeableness, neuroticism and openness to experience. Each domain is assessed by 12 items with each item scoring on a 5-point Likert scale with scores ranging from 0 = 'very inaccurate' to 4 = 'very accurate'. A total subscale score can range from 0 to 48 for each dimension. Higher scores in a certain personality domain do not interpret into an equally high overall personality profile as different traits are needed for different tasks at different periods in life. All the items of the USMaP-i are well distributed according to the Big Five personality dimensions based on factor analysis and have a high internal consistency. Cronbach's alpha values of 0.80, 0.83, 0.63, 0.81 and 0.70 are reported for extraversion, conscientiousness, agreeableness, neuroticism and openness for the experience domain respectively. Factor analysis showed all 60 items to be nicely loaded into five constructs with factor loading values of more than 0.3 (Muhd Saiful *et al.,* 2010). In the current study, Cronbach's alpha values of 0.64, 0.74, 0.57, 0.64 and 0.55 were demonstrated by the traits of extraversion, conscientiousness, agreeableness, neuroticism and openness to experience, respectively.

Anthropometric measurements

Height was measured using a SECA Body Meter standardised wall-mounted height

board with a sliding head piece that can measure up to 2 m. The head of the respondent was positioned in the Frankfort horizontal plane with feet together, knee straight, heel, buttocks and shoulder blades in contact with the wall. Weight was measured using a TANITA electronic weighing scale that was placed on a flat, hard surface which allowed the respondents to stand on it without rocking or tipping over. Waist circumference was obtained by measuring the distance around the smallest area below the rib cage and above the umbilicus (belly button) with the respondents in a standing position. A bendable and non-stretchable measuring tape was used and placed at the level of the navel in a horizontal line. The tape should be snug but should not compress the skin and the measurement was taken at the end of a normal expiration. Height, weight and waist circumference of the respondents were measured at the school by the researchers and trained enumerators. Both height and weight measurements were used to calculate Z-score for BMI-for-age using WHO AnthroPlus Version 1.0.4 Software and later classified based on the WHO Growth Reference (2007). Waist circumference measurement was compared with waist circumference percentile values and the 90th percentile was used as the cut-off to indicate abdominal obesity of the respondents (Poh *et al*., 2011).

Energy intake

Current energy intake was measured through a 24-h dietary recall in which the interviewers asked the respondents to recall food and beverage consumption the day before. Details such as preparation methods and brand name of processed foods were recorded as well. Measuring cups and spoons were used to help respondents estimate the amount of food and beverage consumed. Dietary intake data were used to determine total energy of the respondents. The estimated intake was later computed and analysed using Nutritionist Pro software and the data were referred to Nutrient Composition of Malaysian Food database and other databases such as Singapore Food Facts and USDA Standard Reference Database. All the results were presented as means and standard deviations.

Statistical analysis

Data were analysed using the statistical software package IBM SPSS Statistics version 20.0. Descriptive analysis was done to obtain frequency, mean and standard deviation of each variable studied. The association between continuous variables and energy intake was determined using Pearson product-moment correlation. An independent sample *t*-test was used to determine the mean differences of energy intake according to the sex of the respondent and parental educational level. The level of significance was set at $p<0.05$.

RESULTS

A total of 430 respondents was included in this study, of whom 46.3% were males and 53.7% females (Table 1). About 36.3% of the respondents were Form 4 students, while 34.7% were Form 2 students and the rest were Form 1 students, with a mean age of 14.4 ± 1.3 years. The distribution of the respondents' parental educational level showed that half of the fathers had completed secondary school while the other half had completed tertiary education. Most of the mothers had received secondary school education (57.2%). The fathers earned an average monthly income of RM3720 ± 2792, while mothers had a median monthly income of RM800.

A proportion of 6.1% of the respondents were thin, 67.2% were in the normal weight category and another 26.7% were overweight and obese. Waist circumference classification showed that 18.8% had a high risk of developing abdominal obesity (Table 1).

Table 1. Study characteristics of the respondents (n = 430)

Characteristics	*n*	*(%)*	*mean±SD*
School level			
13	125	(29.0)	
14	149	(34.7)	14.43 ± 1.25
16	156	(36.3)	
Sex			
Male	199	(46.3)	
Female	231	(53.7)	
Ethnicity			
Malay	364	(84.7)	
Chinese	34	(7.9)	
Indian	29	(6.7)	
Others	3	(0.7)	
Religion			
Islam	366	(85.1)	
Buddhist	32	(7.4)	
Hindu	25	(5.8)	
Christian	7	(1.6)	
Father's educational level			
Secondary education	215	(50.0)	
Tertiary education	215	(50.0)	
Mother's educational level			
Secondary education	246	(57.2)	
Tertiary education	184	(42.8)	
Father's monthly income			
< RM1500	66	(15.3)	
RM1500 – RM2999.99	115	(26.7)	RM 3720.62 ±
RM3000 – RM4999.99	132	(30.8)	2792.83
RM5000 – RM9999.99	96	(22.3)	
≥ RM10000	21	(4.9)	
Mother's monthly income			
< RM1500	244	(56.7)	
RM1500 – RM2999.99	65	(15.2)	
RM3000 – RM4999.99	75	(17.4)	RM 800[a]
RM5000 – RM9999.99	38	(8.8)	
≥ RM10000	8	(1.9)	
BMI-for-age classification			
Thinness	26	(6.1)	
Normal	289	(67.2)	
Overweight and obese	115	(26.7)	
Abdominal obesity classification			
Low risk	349	(81.2)	
High risk	81	(18.8)	72.65 ± 10.93

[a] median

Table 2. Mean score of personality traits and energy intake of the respondents, n = 430

	Male (n = 199)	*Female (n = 231)*	*Total*	*t*
Personality				
Extraversion	24.75 ± 4.59	25.38 ± 4.53	25.10 ± 4.64	-1.434
Openness to Experience	25.89 ± 4.86	29.08 ± 5.78	26.08 ± 4.84	-0.752
Neuroticism	22.25 ± 4.45	24.37 ± 4.38	23.38 ± 4.53	-4.961**
Agreeableness	22.25 ± 4.44	24.37 ± 4.37	23.38 ± 4.53	-4.961**
Conscientiousness	23.14 ± 4.25	23.19 ± 4.11	23.16 ± 4.17	-0.125
Dietary intake				
Energy (kcal)	1425 ± 583	1232 ± 462	1322 ± 529	3.776 **

Note: Values in table are mean ± SD
** Significant at the $p<0.01$ level

Table 3. Correlations between independent variables and energy intake of the respondents, n = 430

Variables	*r/t*	*p value*
Mothers' income	-0.036	0.455
Fathers' income	0.072	0.138
Fathers' educational level	-0.756	0.450
Mothers' educational level	-1.933	0.054
Extraversion	0.083	0.087
Openness	0.086	0.175
Neuroticism	- 0.005	0.914
Agreeableness	- 0.005	0.914
Conscientiousness	- 0.158**	0.001
BMI-for-age	- 0.147**	0.002
Waist circumference	- 0.108*	0.025

** Significant at the $p<0.01$ level, *Significant at the $p<0.05$ level

Female respondents had a higher score for each personality trait with females significantly tending to be neurotic (t=-4.961, $p<0.01$) and agreeable (t=-4.961, $p<0.01$) compared to male respondents. As for the mean of energy intake, males had a significantly higher consumption compared to females (t=3.776, $p<0.01$) (Table 2).

Table 3 shows both fathers' and mothers' incomes not being significantly associated with the energy intake of the respondents. There was also no significant difference in energy intake of the respondents for both fathers' (t=0.756) and mothers' educational level (t=-1.933). Generally, no association was found between personality traits and energy intake, except for the conscientiousness trait where the respondents with low conscientiousness were found to consume more calories than respondents with high conscientiousness (r=-0.158, $p<0.01$). Both BMI-for-age (r=-0.147, $p<0.01$) and waist circumference (r=-0.108, $p<0.05$) were inversely associated with the energy intake of the respondents. Leaner respondents significantly had a higher energy intake compared to non-leaner respondents.

DISCUSSION

The present study found that parents' income was not associated with the energy intake of their children. Similarly, a study conducted by Nagi, Chawla & Sharma (1995) showed that there was no difference in energy intake of adolescents from different income groups of parents. The intake of daily total calorie among children and adolescents was not significantly associated with income of the parents (Wang et al., 2009). As teenagers, adolescents spend a significant amount of time at school and they may have their important meals such as breakfast and lunch at school as well. Compared to children, teenagers usually receive a higher amount of pocket money from their parents. Although they have more freedom in terms of food purchasing than children, but at that age, they might have poor money management. The pocket money may be more likely spent on purchasing the latest gadgets and trendy clothing rather than on purchase of foods during school hours (Kooreman, 2000).

Neuroticism and agreeable personality traits were more prevalent among female respondents. Previous studies found similar findings in which females scored higher in both neuroticism and agreeableness traits than males among the adolescent population (Vianello *et al.*, 2013). The sex hormone estrogen in females that regulate mood and behaviour may cause females to be more susceptible to an even greater level of negative mood states than male counterparts. As they grow up, girls are expected to fulfil the roles of becoming mother or housewife. This strict norm of socialisation that exists within the family and the society may explain why neuroticism is often seen among females as they try to match the expectations related to marriage and relationship (Sharma, 2013). Agreeableness is highly associated with femininity. Females have a more interdependent self-construal where there is a tendency for them to become dependent and invest in other people emotionally (Goldberg & Strycker 2002). Thus, they are more motivated to maintain affiliation to social groups by enacting more agreeable traits compared to the male sense of self (Markus & Kitayama, 1991).

The current result showed that adolescents with high conscientiousness had a lower energy intake. Similar results were found by Sutin *et al.* (2011) who found high conscientious individuals to be usually thinner as they are organised and closely follow their diet and meal plans. They are not likely to over-eat under stressful situations unlike low conscientious individuals (who are dieters or self-oriented perfectionists) who may have less control under stress situations and as a result may shift their preference to more palatable and high energy dense foods (O'Connor *et al.*, 2004). High conscientious individuals perceive themselves to be more capable when dealing with stressful events by concentrating actively on proper solutions (Penley &Tomaka, 2002).

In the current study, no other traits were found to be associated with energy intake of the respondents. However, previous studies mentioned individuals with high neuroticism, high extraversion, low openness to experience and low agreeableness to have a higher amount of energy intake and practice unhealthy diets (Mottus *et al.,* 2013; Capello & Markus, 2014).

All the personality measurements in the studies discussed were all self-reported and known to be culture-specific. This phenomenon is recognised as the reference group effect because the relationship between personality and food intake is not the same across different cultures (Goldberg & Stycker, 2002; Heine *et al.*, 2002). Different countries have their own unique food culture and factors such as the cost of food and availability of food that could affect the relationship between personality and dietary intake. This was observed in the current study when compared to other studies (Lunn *et al.,* 2014).

Findings on positive associations between BMI-for-age and waist circumference with energy intake suggested that leaner respondents have a significantly higher energy intake compared to non-leaner respondents. This finding corresponds to those of other studies which reported both overweight boys and girls having a lower calorie intake compared to non-overweight adolescents (D'Addesa *et al*., 2010; Zalilah *et al*., 2006). A study among Spanish adolescents showed that leaner respondents were found to have a higher energy intake (Cuenca-Garcia *et al*., 2013). It is possible the overweight respondents under-reported their food intake to mask the actual intake or they are not even aware of their food intake as a consequence of the mechanical nature of eating (Livingstone & Black, 2003). These overweight individuals may presumably be on a diet and already restrict their food intake to lose weight during the period of study, thus resulting in a lower energy intake compared to their normal weight counterparts (Santos *et al*., 2010; D'Addesa *et al*., 2010).

There are several limitations noted in this present study. This is a cross-sectional study that was conducted at a single point in time. Therefore conclusions on the cause and effect relationship between the variables could not be drawn. In the current study, energy intake was obtained using a single 24-h dietary recall which may not reflect the overall dietary practice of the respondents.

CONCLUSION

The principal findings of the present study demonstrate that the conscientiousness trait is associated with energy consumption among adolescents. This result confirmed previous findings that personality plays an important role in determining energy intake. However, the correlation value in the current study is low due to the nature of the dependent variable, energy intake. Dietary intake data is known to be susceptible to under-reporting and over-reporting by respondents. The results of the current study should be interpreted cautiously.

In conclusion, the current study findings provide preliminary evidence regarding the association between personality traits and energy intake. More studies should be undertaken to relate personality traits with dietary intake as part of obesity prevention strategies.

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Conflict of interest

The authors have no affiliations and involvement in any organisation with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

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