

Association of Personality Traits with Dietary Habits and Food/Taste Preferences

Abstract

Background: Personality plays an important role in food choices. The aim of this study was to assess the association of personality traits with dietary habits and food preferences. **Methods:** This cross-sectional study was carried out on 224 healthy female students aged 18–30 years with a normal BMI. Dietary habits, food preferences, and personality were assessed using validated questionnaire. **Results:** Our results showed that neuroticism and openness were associated with low scores while conscientiousness was related to high scores of dietary habits ($r = -0.33$, $P < 0.001$, $r = -0.13$, $P < 0.05$ and $r = 0.26$, $P < 0.001$, respectively). In addition, neuroticism was correlated with preference to salty, sour and fatty foods and negatively associated with dairy products ($P < 0.05$). Extraversion showed a positive correlation with preference to fast foods, ice cream, chocolate, cocoa, and negative correlation with meat. Openness was positively correlated with preference for meat and biscuit and negatively correlated with fruits ($P < 0.05$). Agreeableness was related to having soft drinks and sweetened fruit juices and conscientiousness had a positive association with preference to dairy products, vegetables, nuts, food with salty tastes, and a negative association with biscuits ($P < 0.05$). **Conclusions:** Overall, assessing personality traits could be useful to identify young women who may be at risk of unhealthy dietary habits.

Keywords: Body mass index, feeding behavior, food preferences, personality, taste

Introduction

Healthy nutritional habits play an important role in the prevention of chronic disease and can enhance well-being, longevity, mental potency and efficiency.^[1] Dietary habits and food preferences are complex processes depend on a multitude of influences that can be classed as food, consumer, or environmentally related. Among the factors determining dietary habits and food preferences, psychological factors play an important role.^[2] Personality is considered to be an important element^[3] and individual discrepancies in food preferences and dietary habits can depend on underlying differences in personality.^[4]

Limited studies have examined the link between personality traits and dietary habits suggesting that some personality traits are related to nutritional aspects. In a study conducted by Mottus *et al.* in Estonians, higher scores on a “health aware diet” were associated with lower neuroticism and higher extraversion, openness, and conscientiousness. Higher scores on the

“traditional diet” were related to lower levels of openness.^[5] Another study conducted on couples from the University of North Carolina Alumni Heart study demonstrated that only openness was associated with ratings of dietary quality for both wives and husbands.^[6]

To the best of our knowledge, limited studies have examined the potential relationship between personality and taste preferences. In a study conducted by Byrnes and Hayes, personality constructs of sensation seeking and sensitivity to reward showed positive correlations with preference for spicy foods.^[7] Kikuchi and Watanabe reported that students who scored high for neuroticism prefer salty and sweet tastes. In addition, the individuals with high scores of openness and agreeableness did not like salty tastes.^[8] In Dublin Business School students, however, high scores for conscientiousness and openness were not correlated with food preferences.^[9]

No study, to date, has reported the association of personality with preferences for different food groups. Dietary habits are

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likely to be related to historical, geographical, and cultural settings. Furthermore, young women as future mothers will have a pivotal role in establishing family habits and would benefit from advice on healthy nutritional preferences. Therefore, the present study was designed to assess the association of personality traits with dietary habits and food preferences in female students.

Methods

Participants

This cross-sectional study was conducted on a sample of 224 female students aged 18–30 years at Ahvaz Jundishapur University of Medical Science, Ahvaz, Iran, from December 2013 to April 2014. The study population was 3500 students. The initial sample size of 196 subjects was obtained in accordance to ratio formula based on 95% confidence level ($\alpha = 0.05$), $Z = 1.96$, $P = 0.5$ and $d = 0.07$ and it was then increased to 236 subjects for more coverage. Considering the variety of personality traits in a given population, the maximum ratio of a proportion was considered 50 percent. Finally, 224 individuals entered the study.

$$n = \frac{Z^2_{1-\alpha/2} P(1-P)}{d^2} = \frac{(1.96)^2 (0.5)(0.5)}{(0.07)^2} = 196$$

The participants were recruited from 7 faculties of the University (faculty of pharmacy, medicine, para-medicine, health, dentistry, rehabilitation, nursing, and midwifing) using a multistage random-sampling method. All subjects included in this study were free from chronic diseases such as diabetes, heart, kidney and liver disease and cancer and had no mental disorders. They were not on special diets or medications and also were not smokers, pregnant, or lactating.

Measures

Personality traits were assessed using a validated Persian version^[10] of the NEO-Five Factor Inventory (NEO-FFI), which consists of 60 items which measures the basic structure of normal personality according to five major dimensions of personality. These are, also called the big five and include neuroticism (tendency to experience negative emotions), extraversion (quantity and intensity of one's interpersonal interactions), openness to experience (proactive seeking and appreciation of new experiences), agreeableness (tendency to have faith in other people and to be eager to help them) and conscientiousness (degree toward goal directed behaviors). Each personality trait is addressed by 12 items. The five responses vary between “strongly disagree” to “strongly agree” options on a Likert scale.^[11] The responders obtain a score of 0–4 on each question and a total score of 0–48 for each of the five dimensions of personality traits. The NEO-FFI has been shown to be a valid and reliable assessment tool.^[12,13]

The dietary habits questionnaire contains 20 questions that were designed by the authors. Some examples of dietary habits items included “eating breakfast”, “having irregular meals during the day”, “eating even being satiety”, “eating fast”, “consumption of junk foods when being hunger”, “adding salt to meals”, “drinking water or other drinks with meals”, “eating along with doing something else such as watching TV”. The responses vary between “always” to “never” options on a five-point scale of 1 to 5. So, taken together, the least score of this questionnaire was 20 indicating the unhealthiest dietary habits and the maximum score was 100 implying the healthiest dietary habits. The validity of the questionnaire was evaluated by five nutritionist professors. Drawbacks were examined and some further questions were added, deleted, or modified to make the final questionnaire. To assess the reliability of questionnaire, a pilot study ($n = 20$) was undertaken on a separate sample of female students that was confirmed by 0.75 Chronbach alpha coefficient.

A self-administered questionnaire on food preferences was designed by the authors to assess the different food groups and kinds of taste preferences based on 19 questions. Of these, 5 items referred to preferences for sweet, salty, sour, spicy, and fatty tastes. The other 14 items assessed the preferences for different food groups including bread and cereals, meats, grains, milk, and dairy products, fruits, vegetables, biscuit, cake and cookies, ice cream, chocolate and coca, soft drinks and sweetened fruit juices, chips and puff, tea and coffee. Responses to the items were on a four-point scale (high, moderate, a little, never). The content validity of questionnaire was confirmed by the same nutrition experts and refinements were made to make the current questionnaire. Pilot testing ($n = 20$) on a sample of female students and Chronbach alpha coefficient of 0.72 was obtained.

Procedures

Prior to study, each student was briefed about the purpose of research and assured of confidentiality and anonymity and written consents were obtained from all participants. Subjects were asked to complete the mentioned questionnaire as honestly as possible with the first response which came to mind. Completion of the questionnaires took approximately 30 min. Height was measured to the nearest 0.1 cm and body weight was measured to the nearest 0.1 kg. Body mass index (BMI) was calculated by dividing the weight (in kg) by the square of height (in m). Personal information including age, marital status, place of residence and physical activity level were also recorded. The project was approved by University Medical Ethics Committee.

Data analysis

All analyses were performed using SPSS version 19.0 and the results were considered significant if P value was less than 0.05. Association between personality traits and score

of dietary habits were analyzed using Pearson's correlation coefficient. Spearman's correlation coefficient was also applied to assess the association between personality traits and food preferences. In addition, stepwise multiple regression was conducted to identify which personality traits were more correlated with the dietary habit score.

Results

More than half of students were resided in university dormitories and more than two-third of them reported low levels of physical activity [Table 1]. The mean dietary habit score of study population was 70.9 ± 9.2 . The highest and lowest scores of personality traits belonged to conscientiousness and neuroticism, respectively [Table 2]. High neuroticism ($r = -0.33, P < 0.001$) and openness ($r = -0.13, P < 0.05$) were significantly associated with low scores of dietary habits. In addition, high conscientiousness was significantly related to high score of dietary habits ($r = 0.26, P < 0.001$). There was no significant correlation between dietary habits and age, weight, height, BMI, marital status, place of residence, and physical activity levels. The same results were seen for personality traits.

As shown in Table 3, in the first step of multiple regression, high neuroticism was the most predictor of low dietary habits score, explaining 11% of the dietary habits score (model 1). In the second step, high openness was predictor of low dietary habits score inferring that both neuroticism and openness explained 13% of the dietary habits score (model 2). In the final model, high conscientiousness was a significant contributor for high score of dietary habits inferring that 3 mentioned personality traits totally explained 16% of the dietary habits score (model 3).

High neuroticism had a positive correlation with preference for salty ($r = 0.22, P < 0.05$), sour ($r = 0.17, P < 0.05$), and fatty tastes ($r = 0.13, P < 0.05$) and showed a near-significant association with preference for spicy taste ($r = 0.13, P = 0.05$) [Table 4]. High conscientiousness was associated with low preference for salty taste ($r = -0.14, P < 0.05$).

The link between personality traits and food groups preferences is shown in Table 5. High neuroticism had a negative relationship to preference for milk and dairy products ($r = -0.15, P < 0.05$). High levels of extraversion showed a positive correlation with preference for fast foods ($r = 0.15, P < 0.05$) and ice cream ($r = 0.14, P < 0.05$), chocolate and cacao ($r = 0.19, P < 0.05$) and a negative relationship with preference for meats ($r = -0.21, P < 0.05$). High openness, was positively correlated with preference for meat ($r = 0.18, P < 0.05$) and biscuit, cakes and cookies ($r = 0.15, P < 0.05$) and was negatively associated to desire for fruits ($r = -0.17, P < 0.05$). In addition, high agreeableness indicated a negative preference for soft drinks and sweetened fruit

Table 1: Basic characteristics of the students (n=224)

Variables	Mean±SD	Percentage
Demographic		
Age (years)	22.2±2.5	
Weight (kg)	56.7±8.1	
Height (cm)	161.5±8.7	
BMI (kg/m ²)	21.6±2.8	
Marital status (single)		92%
Resident in dormitory		54.5%
Physical activity		
Regularly		13.8%
Sometime		71%
No physical activity		15.2%
Personality traits scores		
Neuroticism	21.6±7.5	
Extraversion	29.8±5.8	
Openness	27.4±4.5	
Agreeableness	31.1±3.5	
Conscientiousness	32.9±6.7	
Dietary habits score	70.9±9.2	

Table 2: Pearson's correlation coefficient between personality traits and score of dietary habits (n=224)

Personality traits	Correlation Coefficient	P
Neuroticism	-0.33	<0.001
Extraversion	0.08	0.21
Openness	-0.13	0.045
Agreeableness	0.12	0.07
Conscientiousness	0.26	<0.001

Table 3: Stepwise multiple regression analyses for the contribution of personality traits to the dietary habits score (n=224)

Standard regression coefficient (SE)	t	P	R ^{2a}	
Model 1*				
Neuroticism	-0.33 (0.07)	-5.12	<0.001	0.11
Model 2**				
Neuroticism	-0.32 (0.07)	-5.1	<0.001	0.13
Openness	-0.16 (0.1)	-2.59	0.01	
Model 3***				
Neuroticism	-0.26 (0.08)	-3.93	<0.001	0.16
Openness	-0.16 (0.1)	-2.67	0.008	
Conscientiousness	0.17 (0.09)	2.58	0.011	

a: R² is calculated for each regression model. *F=26.21; P<0.001, **F=16.78; P<0.001, ***F=13.69; F0.001

juices ($r = -0.17, P < 0.05$). High conscientiousness showed a positive correlation with preference for milk and dairy products ($r = 0.19, P < 0.05$), vegetables ($r = 0.19, P < 0.05$) and nuts ($r = 0.18, P < 0.05$) and negative relationship to preference for biscuit, cakes and cookies ($r = -0.13, P < 0.05$). No significant association was seen between food preferences or personality traits and subjects' age, weight, height, BMI, marital status, place of residence, and physical activity levels.

Table 4: Spearman’s correlation coefficient of personality traits and taste preferences (n=224)

Taste preference	N		E		O		A		C	
	R	P	R	P	R	P	R	P	R	P
Sweet	-0.04	0.53	0.06	0.35	0.04	0.52	-0.06	0.37	-0.06	0.35
Salty	0.22	0.001	-0.11	0.11	0.09	0.17	0.04	0.55	-0.14	0.04
Sour	0.17	0.01	-0.05	0.42	0.02	0.15	-0.09	0.19	-0.04	0.59
Spicy	0.13	0.05	0.07	0.31	0.05	0.47	0.09	0.19	0.001	0.98
Fatty	0.13	0.049	0.09	0.21	0.12	0.08	0.001	0.98	0.001	0.99

N; Neuroticism, E; Extraversion, O; Openness, A; Agreeableness, C; Conscientiousness

Table 5. Spearman’s correlation coefficient of personality traits and food groups preferences (N=224)

Food groups preference	N		E		O		A		C	
	R	P	R	P	R	P	R	P	R	P
Breads and cereals	0.02	0.74	0.08	0.19	0.03	0.66	-0.02	0.75	0.08	0.26
Meats	-0.12	0.08	-0.21	0.002	0.18	0.007	0.09	0.12	0.03	0.68
Grains	-0.01	0.87	0.07	0.29	0.03	0.66	0.04	0.6	0.07	0.27
Milk/dairy products	-0.15	0.02	0.06	0.42	-0.07	0.27	0.09	0.18	0.19	0.004
Fruits	-0.05	0.5	0.008	0.9	-0.17	0.01	0.05	0.44	0.09	0.18
Vegetables	-0.04	0.6	0.08	0.21	-0.06	0.4	0.01	0.87	0.19	0.004
Nuts	0.009	0.9	0.1	0.16	-0.05	0.45	0.05	0.43	0.18	0.006
Fast foods	-0.04	0.057	0.15	0.03	0.15	-0.001	0.89	0.42	0.06	0.2
Biscuit/cake/cookies	0.12	0.07	0.06	0.41	0.15	0.03	-0.002	0.97	-0.13	0.045
Ice cream	0.10	0.15	0.14	0.04	-0.03	0.65	0.03	0.7	0.10	0.14
Chocolate and coca	0.127	0.06	0.19	0.005	0.001	0.95	0.03	0.65	0.12	0.07
Soft drinks and sweetened fruit Juice	0.07	0.29	0.12	0.07	-0.03	0.66	-0.17	0.01	0.02	0.08
Chips/puff	0.127	0.06	0.02	0.74	0.02	0.79	0.04	0.54	-0.08	0.23
Tea and coffee	-0.02	0.77	0.07	0.27	0.04	0.53	0.04	0.53	-0.001	0.99

N; Neuroticism, E; Extraversion, O; Openness, A; Agreeableness, C; Conscientiousness

Discussion

The present study was aimed to assess the possible associations between personality traits and dietary habits and also food preferences. It demonstrates that high neuroticism was significantly associated with low score of dietary habits and is consistent with previous studies. In the Helsinki Birth Cohort Study, Tiainen *et al.* found that neuroticism was associated with lower fish and vegetables intakes^[14] and was positively related to endorsing the “convenience diet” and negatively associated with following the “Mediterranean diet” in another study.^[15] Whilst, in overweight and obese women concluded that higher neuroticism had a positive relationship with dis-inhibition and susceptibility to hunger.^[16] Other studies have shown a negative correlation between neuroticism and healthy eating.^[1,17,18]

One of the facets of the neurotics is hastiness and individuals with this character are unable to control their lust, passion desires even for consuming the food. So, in high scores of neuroticism, the desires are so strong that

they cannot be controlled. The other aspects of neuroticism are feeling depressed and vulnerability to stress^[11] leading them to choose unhealthy options.^[19] So, it seems that association of neuroticism with unhealthy dietary habits mediates indirectly by adopting counter-regulatory emotional eating and responding to negative emotions and stress by unfavorable food habits.^[17,20]

There was no significant association between high extraversion and the score of dietary habits. Brummett *et al.* did not report any significant link between extraversion and self or spousal rating of dietary quality.^[6] Goldberg and Strycker also suggested that extraversion had no significant correlation with General Healthy Diet in the members of Eugene-Springfield Community Sample.^[21] On the other hand, Mõttus *et al.* performed another study in Estonians aged 18-89 years and concluded that higher extraversion was related to higher scores on the “health aware diet”.^[5] Provencher *et al.* suggested that high extraversion has a positive association with disinhibition and susceptibility to hunger.^[16]

We observed that high openness was significantly associated with low score of dietary habits, and is in accord with Kikuchi and Watanbe's study indicating a negative relationship between high openness and avoidance of burnt fish or meat.^[8] However, in some studies openness was related to a "general healthy diet",^[21] high consumption of fruits and vegetables,^[14,17,22] low consumption of confectionary items and chocolate.^[14] Furthermore, openness was positively related to following the "health aware diet" and negatively related to following the "traditional diet".^[5]

In terms of agreeableness, no significant association was observed between this trait and the score of dietary habits and is similar to the results of Goldberg and Strycker's^[21] and Brummett *et al.*^[6] However, Cho *et al.* found a positive association between agreeableness and good dietary habits in college students,^[23] while Provencher *et al.* also reported that higher agreeableness predicted a lower susceptibility to hunger.^[5]

In our study, high conscientiousness showed a positive association with high score of dietary habits and agrees with Provencher *et al.* who found that high scores on conscientiousness were positively related to cognitive dietary restraint and negatively correlated to susceptibility to hunger. In another studies having a healthy diet was associated with conscientiousness.^[17,20,21]

Conscientious individuals have features such as loyalty, being trier to success and caution in making decision, and are also purposeful and determined.^[11] So, they seem successful in accepting nutritional education and following the healthy dietary habits. Indeed, the relation between conscientiousness and healthy dietary habits is indirectly mediated by promoting regulatory restrained eating (i.e., selective restraint of energy intake) and reducing emotional and external eating (i.e., eating when external food cues present in the environment).^[17,19]

As the interpretation of the regression of personality traits on dietary habits score, it is important to note that among the big five personality traits, high neuroticism was the strongest inverse predictor of dietary habits score. It was followed by high openness and then high conscientiousness as the most predictor of healthy dietary habits. Taken together, these three mentioned personality traits can predict healthy or unhealthy dietary habits. In terms of association of personality traits and food preferences, high neuroticism was shown positively correlated to preference for salty, sour and fatty foods and negatively correlated to preference for milk and dairy products. The neurotics prefer unhealthy tastes and foods to overcome their negative feelings.^[19]

High extraversion showed positive correlation with preference for fast foods, ice cream, chocolate and cacao and a negative relation to preference for meats. Extraverts were social, warm, loving and tend to participate in social

groups.^[11] They are also willing to positive emotions such as joy, happiness and love. Accordingly, extraverts may tend to eat varied snacks like fast foods, ice cream, chocolate and cacao which can be considered as pleasurable and positive emotions.

High openness was also positively correlated with preference for meats and Biscuit/cake/cookies and negatively associated to desire for fruits. Generally, individuals with high openness seek diversity and are flexible in actions and behaviours. These features are usually seen in various activities such as eating unusual foods. These people prefer novelty and diversity rather than routine activities and due to their intellectual curiosity, experience for new foods.^[11] Accordingly, they may prefer to consume certain food groups with higher variability and to use new food items like Biscuit/cake/cookies. High agreeableness showed a negative relation to preference for soft drinks and sweetened fruits juices. Those individuals with high scores on agreeableness have features such as trust, simplicity, companionship and also having high potency in adaptation to people and environment.^[11] So, it seems that they are successful in endorsing the healthy dietary habits and, therefore, they seldom consume soft drinks and sweetened fruit juices. High conscientiousness had a positive correlation with preference for milk and dairy products, vegetables and nuts and negative relationship to preference for salty foods and biscuit/cake/cookies. Conscientious individuals seem eager for achieving healthy dietary habits and avoiding from harmful consequences.^[11]

The present study had particular strengths. It is the first to explore the relation between personality traits and preferences for different food groups. Secondly, the dietary habits questionnaire was completed in a stable mood state while participants were not hungry to avoid preferences for any foods. Finally, as other researches exhibit gender bias, we decided to include females to create a situation in which results might be more generalizable and establish gender-specific evidence-based guidance.

However, we had limitations regarding the methodological issues. First, our study was a cross-sectional research and, therefore, no causal association between personality traits and dietary habits or food preferences can precisely be addressed. Second, the economic status of the participants in the questionnaire was not assessed.

Conclusion

Higher conscientiousness and lower neuroticism and openness contribute to healthier dietary habits. In addition, high scores on conscientiousness and agreeableness and low scores on neuroticism are related to healthier food preferences. From a clinical viewpoint, assessment of personality traits could be useful to identify individuals that may be at risk of unhealthy dietary habits. Tailored nutrition education is, therefore, suggested based on an

appropriate approach, which takes into account individual trait differences to modify the dietary habits and food preferences in order to improve the individuals' health and prevention of chronic disease in students.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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