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Nutritional Knowledge, Attitudes and Practices among University Students in Turkey and the US

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ABSTRACT The aim of this study is to explore the differences in nutritional knowledge, attitudes and practices of students attending the Faculty of Education of Gazi University, Turkey and of the students at St. Cloud State University, USA regarding culture. In all, 1674 subjects, aged 16-27 participated in the study voluntarily. The data was collected by means of a demographic information form and Nutritional Attitude Inventory. Independent samples t-test and Pearson correlation tests were used. The Cronbach's Alpha values for the *nutritional knowledge*, *nutritional attitude* and *nutritional practice* subscales computed as 0.73, 0.76 and 0.72, respectively. Kaiser-Myer-Olkin coefficient (.84) and Bartlett's test of sphericity (χ^2=17296.304), ($p<0.00$) were conducted to assess the adequacy of the data for factor analysis. In conclusion, the nutritional attitude subscale had a moderate correlation with nutritional practice and nutritional knowledge subscales, while there was a weak significant correlation between the nutritional practice and nutritional knowledge subscales regarding the nutritional inventory of students from two different countries.

INTRODUCTION

The most important feature determining societies' eating habits is their culture. Culture is the primary factor in establishing the nutritional knowledge, attitudes and practices in a society and nutritional patterns change from culture to culture (Küçük and Kahyaoglu 2013).

Children tend to reflect their parents nutritional habits and attitudes until adolescence, however, because of the physiological and social changes and being away from their parents and home, their nutritional patterns may change after they start higher education (Acar Tek et al. 2011; Blicfeldt and Gram 2013). An adequate diet and balanced nutrition attitude, the most significant determinants of health, develops during university years where adolescence ends and youth begins (Aslan et al. 2016) when individuals are on their own and responsible for what they eat. Recent research suggests that undergraduate students should eat from main food groups daily for an adequate diet and balanced nutrition (Australian Dietary Guidelines 2013). Nutritional courses on nutritional knowledge given at university level has been recommended as an effective strategy to prevent weight gain, inactive lifestyle, decrease sodium and saturated fat consumption, and increase the intake of fruit and vegetables, and the intake of fiber (Matthews et al. 2016). Research has shown that undergraduate students can develop chronic diseases more easily as they have inadequate knowledge on nutrition (Hyska et al. 2014). Having nutritional knowledge may affect individual's eating attitudes which may be positive or negative.

Nutritional practices of undergraduate students are affected by various factors such as culture, socio-economic status, age, occupation, dietary beliefs, and good nutritional knowledge, level of students and mothers (Vereecken and Maes 2010; McLeod et al. 2011). Recent studies support that most undergraduate students do not have enough nutritional knowledge, attitude and practices nor do they choose healthy food, have a varied diet or healthy lifestyle (Hakim et al. 2012; Schnettler et al. 2015; Lupi et al. 2015; Ruby et al. 2016).

Nutritional knowledge, attitudes and practices of societies may vary according to culture and country. Therefore, the aim of this study is to explore the differences regarding culture in nutritional knowledge, attitudes and practices of

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students attending the Faculty of Education of Gazi University in Ankara, Turkey and the students at St. Cloud State University in Minnesota in the USA.

Objectives

The aim of this paper is to compare the nutritional knowledge, attitudes and practices of the students attending the Faculty of Education at Gazi University in Ankara, Turkey and St. Cloud State University located at the city of St. Cloud in the State of Minnesota United States. In this paper, the following hypotheses are investigated:

1. Is there a difference in student nutritional attitude between universities?
2. Is there a difference in student nutritional attitude with respect to gender?
3. Is there a difference in student nutritional attitude with respect to nutrition education status?
4. Is there any correlation between the subscales of the student Nutritional Attitude Inventory?

METHODOLOGY

Samples

Relational data model is used in this study. The study has two sample groups. The first sample group consists of 889 students (female =648, male=241) selected with simple random sampling from those attending the Faculty of Education at Gazi University. The second sample group consists of 785 students (female=442, male= 337) enrolled at St. Cloud State University. The study is carried out with an overall total of 1674 students. The percentages of the study group students aged 20-23, 16-19 and 24-27 are 66.2 percent, 23.5 percent and 10.2 percent, respectively. The percentages of freshman, sophomore, junior and senior students were 11.4 percent, 23.4 percent, 25.9 percent and 39.3 percent, respectively. 19.4 percent of these students had taken a nutrition education course, whereas 80.6 percent had not.

Measurement Tools

In the study, the Demographic Information Form, and the Nutritional Attitude Inventory developed by (Ozgen 2015) were used for data collection.

Demographic Information Form

This form developed by the researcher comprised questions such as the gender and age of the student, whether he/she had previously attended a nutrition education course, and how long he/she had been residing in this city.

Nutritional Attitude Inventory

Initially the validity-reliability study of the Nutritional Attitude Inventory developed by the researcher was conducted. In the first step, past research on the subject and scales of attitude were investigated, and an item pool was generated. Various studies on nutrition education were reviewed (Barzegari et al. 2011; Huang et al. 2013; Ozgen 2015). These studies investigated nutritional knowledge, nutritional attitude, and nutritional practice subscales separately. Therefore, the student nutritional attitude inventory was constructed with three subscales; namely nutritional knowledge, nutritional attitude and nutritional practice. In the second step, the inventory was submitted to expert review for content validity. Following pilot administration of the nutritional attitude inventory, vague items were reviewed and the scale was prepared for proper administration. The scale was initially developed including a total of 50 items and three subscales (17 items in nutritional knowledge, 17 items in nutritional attitude, and 16 items in nutritional practice). Exploratory factor analysis (EFA) was used in the determination of the construct validity of the Nutritional Attitude Inventory. Independent sub-factors of the scale were determined using principal component analysis (PCA) and Varimax rotation. Items with factor loadings greater than 0.30 and Eigen values greater than 1.00 were included in the scale. The three-factor structure of the scale was improved and the assessment instrument consisting of 50 items was reduced to 35 items through (EFA). Each item in the scale was evaluated with a five-point Likert rating (1=Disagree, 2=Somewhat agree, 3=Moderately agree, 4=Mostly agree and 5=Strongly agree). Items were phrased as positive and negative statements. Negatively scored items were reverse coded. A higher positive item score indicates a favorable increase in nutritional knowledge, attitude and practice subscales.

Data Collection

For the collection of research data, official permissions from the dean's office of Gazi University Faculty of Education, and, in the US, from the Institutional Review Board of St. Cloud State University were obtained. The administration of the data collection instruments was carried out in classrooms at the convenience of the academic staff for both groups, and the scale was administered to the students in groups by the researcher. The students were requested to participate in the study on a voluntary basis and were informed that their information would remain confidential and the data would only be used for research purposes. The surveys were conducted at Faculty of Education Gazi University and St. Cloud State University during the spring and winter semesters in the 2014-2015 academic year, respectively.

Data Analysis

The data was analyzed by using Statistical Package for Social Science (SPSS for Windows 20.0). The existence of a difference with respect to gender and nutrition education status was analyzed with independent samples t-test, and the relationships between the subscales were analyzed with Pearson correlation.

RESULTS

The results of the study are as follows: The factor analysis results of the Nutritional Attitude Inventory, the student mean scores for nutritional knowledge, attitude and practice by university Gazi Faculty of Education and St. Cloud State University with respect to gender and nutrition education status, and the correlation between the nutritional knowledge, attitude and practice subscales, respectively.

As it is seen in Table 1, in the study, the adequacy of data structure for factor analysis was analyzed using Kaiser-Myer-Olkin coefficient (KMO=0.84) and Bartlett's test of sphericity χ^2=17296.304, p<0.00. According to factor analysis results, the Nutritional Attitude Inventory was investigated in three subscales, namely nutritional knowledge, nutritional attitude and nutritional practice, and comprised a total of 35 items. The Cronbach's Alpha values for the nutritional knowledge, nutritional attitude and nutritional practice subscales were computed as 0.73, 0.76 and 0.72, respectively, while Overall Scale Reliability (Cronbach's Alpha) was computed as 0.779. A KMO value greater than 0.70 and the existence of significant sphericity obtained from Bartlett's test indicated that a factor analysis could be conducted (Buyukozturk 2002).

While Gazi Faculty of Education students had a higher (*M=4.0*) nutritional knowledge subscale mean score, the mean score of St. Cloud State University students was lower (*M=3.7*). Similarly, Gazi Faculty of Education students (*M=3.6*) scored higher than St. Cloud State University students (*M=3.4*) in the nutritional attitude subscale. Likewise, the nutritional behavior subscale mean score was found to be greater for Gazi Faculty of Education students (*M*=3.3) than St. Cloud State University students (*M*=3.2). There was a statistically significant difference between the mean scores with respect to university (p<0.05) (Table 2).

When Table 2 is examined, according to University variable, while Gazi Faculty of Education students had a higher (*M*=4.0) nutritional knowledge subscale mean score, the mean score of St. Cloud State University students was lower (*M=3.7*). Similarly, Gazi Faculty of Education students (*M=3.6*) scored higher than St. Cloud State University students (*M=3.4*) in the nutritional attitude subscale. Likewise, the nutritional practice subscale mean score was found to be greater for Gazi Faculty of Education students (*M*=3.3) than St. Cloud State University students (*M*=3.2). There was a statistically significant difference between the mean scores with respect to university (p<0.05).

As it is seen in Table 3, while Gazi Faculty of Education female students had a higher (*M*=47.4) nutritional attitude subscale mean score, the mean score of male students was lower (*M*=44.7). There was a statistically significant difference in the mean scores with respect to gender (p<0.05). In addition, female students(*M*=58.2) scored higher than male students (*M*=57.2) in the nutritional knowledge subscale. The nutritional practice subscale mean score for female students was (*M*=25.2), while that for male students was (*M*=24.8), although these two values are approximate, there was no statistically significant difference (p>0.05). In addition, among those attending St. Cloud State University in the US, female students (*M*=42.0) had a higher nutritional knowledge subscale mean score than male stu-

Table 1: Factor analysis and reliability analysis results for the subscales

Component no.	*Items*	*Factor loading*	*Eigen values*	*% of variance*	*Cumulative*	*Cronbach's Alpha*
Nutritional Knowledge			10.4	19.3	19.3	0.7
1	I eat products that are rich in vitamin A (vegetables that are dark green, orange, and/or, yellow).	0.7				
6	Consuming animal products that are rich in vitamin A (fish oil, liver, egg etc.) are necessary for good health*.	0.6				
8	Consuming products which are rich in vitamin K (green leafy vegetables, soy products, liver etc.) does not contribute to good health*.	0.5				
11	Products that are rich in vitamin B1 (pasta, legumes, cracked wheat, etc.) should be consumed.	0.6				
13	Products that are rich in vitamin B2 such as milk, whey protein of yogurt, liver etc.) should be consumed.	0.7				
21	Consuming products that are rich in folic acid (liver, spinach, etc.) is not necessary for good health*.	0.7				
24	Consuming products that are rich in calcium (milk and yogurt etc.) is not necessary for good health*.	0.7				
26	Consuming products that are rich with Phosphorus (meats, variety meat liver, spleen etc.) is necessary for good health.	0.6				
28	Consuming products that are rich in magnesium (green leafy vegetables and legumes, sparkling water etc.) is not necessary for maintaining a good health*.	0.7				
31	Consuming products that are iron rich (liver, molasses or boiled grape juice, spinach etc.) is necessary for good health.	0.6				
33	Consuming products that are rich with iodine (sea products, vegetables etc.) is not necessary for good health*.	0.6				
35	Consuming products which are rich in zinc (liver, red meat, etc.) is necessary for good health.	0.8				
37	Consuming all kinds of meat and meat products are necessary for good health.	0.7				
44	Consuming (regularly) fish oil pills rather than fish is better for health*.	0.8				
Nutritional Attitude			9.2	17.1	36.3	0.8
14	I prefer to drink tea or coffee with my meals*.	0.7				
16	I prefer to eat food from fast food in restaurants than homemade food*.	0.5				
25	I always read the labels of packaged foods.	0.5				
29	I prefer to consume desserts made of flour rather than milky desserts*.	0.5				
32	On certain occasions (when dieting, when I have health problems etc.) I prefer to take an expert's opinion.	0.6				
34	I prefer to consume salad dressing or mayonnaise and tomatoes sauce with fried food*.	0.6				
36	I don't mind eating food with additives*.	0.7				
39	Every day I prefer to eat leafy vegetables and roots.	0.5				
40	Frequently I prefer to buy some foods from street sellers*.	0.6				
42	Every day I prefer to eat seasonal fresh vegetables and fruits (which are not stored for a long time).	0.6				
46	I like to eat products like fried food and crisps etc. which contain trans fats*.	0.7				
50	I prefer to eat products that are high in vitamins and minerals.	0.7				
55	While cooking I prefer boiling, barbecuing and roasting instead of frying.	0.6				
Nutritional Behavior			7.6	14.1	50.4	0.7
2	Every day I eat or drink one glass of milk, yogurt and/or cheese.	0.5				
3	Every week I eat one portion of or garbanzo, lentil, dry beans etc.	0.9				
5	Every day I drink milk or fruit juice during breakfast.	0.5				
9	I eat red meat, chicken or fish once or twice a week.	0.7				
12	Every day I usually eat (have meals) at the same time of the day.	0.8				
27	Every day I eat (during meals) a variety of foods.	0.5				
47	Every day I eat lunch regularly.	0.8				
51	I have breakfast every day.	0.6				

(KMO) =.8 Bartlett test: $\div^2$ =17296.3, p<0.0
Overall Scale Reliability (Cronbach's Alpha): .7 *Reversely scored items

Table 2: Mean, standard deviation and t-value comparison of subscales by University

Subscale (N=1674)	*University*	*M*	*SD*	*T*	*p*
Nutritional Knowledge	Gazi	4.0	0.5	13.1	0.00*
	St. Cloud State	3.7	0.4		
Nutritional Attitude	Gazi	3.6	0.5	8.2	0.00*
	St. Cloud State	3.4	0.4		
Nutritional Practice	Gazi	3.3	0.4	8.7	0.00[0]
	St. Cloud State	3.2	0.4		

*$p<0.05$

Table 3: Mean, standard deviation and t-value about nutrition knowledge, attitude and practice of the subscales by gender

Subscale	*Gender*	*N*	*M*	*SD*	*t*	*p*
Nutritional Knowledge (1)	Male	648	57.2	8.9	2.0	0.07
	Female	241	58.2	7.7		
Nutritional Attitude (1)	Male	648	44.7	7.6	5.0	0.00*
	Female	241	47.4	7.9		
Nutritional Practice (1)	Male	648	24.9	5.4	1.0	0.38
	Female	241	25.2	5.4		
Nutritional Knowledge (2)	Male	337	41.0	5.3	3.0	0.01*
	Female	448	42.0	5.6		
Nutritional Attitude (2)	Male	337	37.2	6.0	1.0	0.69
	Female	448	37.3	5.2		
Nutritional Practice (2)	Male	337	26.2	6.0	2.3	0.02*
	Female	448	27.1	6.0		

*$p<0.05$ 1: Gazi Faculty of Education Students 2: St. Cloud State University Students

dents (*M*=41.0). The mean scores of female and male students in the nutritional attitude subscale were (*M*=27.1) and (*M*=26.2), respectively. There was a statistically significant difference with respect to gender ($p<0.05$).

When Table 4 is examined, according to attended nutrition education course variable among Gazi Faculty of Education students, those who had attended a nutrition education course had a higher nutritional knowledge subscale mean score (*M*= 59.69), (*M*= 60.0), while those who had not attended a nutrition education course had a lower mean score *(M=59.6)*, (*M*=57.0). Similarly, those who had attended a nutrition education course scored higher in the nutritional attitude subscale (*M*=49.0), while those who had not scored lower (*M*=46.4). The two groups had a statistically significant differ-

Table 4: Mean, standard deviation and t-value about nutritional knowledge, attitude and practice of the subscale by nutrition education status

Subscales	*Attended Nutrition Education Course*	*N*	*M*	*SD*	*t*	*p*
Nutritional Knowledge (1)	Yes	106	60.0	8.0	2.5	.01*
	No	783	57.0	7.7		
Nutritional Attitude (1)	Yes	106	49.0	7.8	2.7	.00*
	No	783	46.4	7.9		
Nutritional Practice (1)	Yes	106	26.0	5.4	1.8	.06
	No	783	25.0	5.4		
Nutritional Knowledge (2)	Yes	218	42.0	5.6	2.1	.04*
	No	566	41.1	5.3		
Nutritional Attitude (2)	Yes	218	38.0	4.7	2.4	.01*
	No	566	37.0	5.4		
Nutritional Practice (2)	Yes	218	27.8	5.2	4.0	.00*
	No	566	26.0	5.5		

*$p<0.05$ 1: Gazi Faculty of Education Students 2: St. Cloud State University Students

ence with respect to nutrition education status ($p<0.05$). However, in the nutritional behavior subscale, although the mean scores of those who had attended a nutrition education course and those who had not were approximate, there was no statistically significant difference ($p>0.05$). Among St. Cloud State University students, those who had attended a nutrition education course had a higher nutritional knowledge subscale mean score (M=42.00), (M=42.0), while those who had not attended a nutrition education course had a lower mean score (M=41.13), (M=41.1). Likewise, those who had attended a nutrition education course scored higher in the nutritional attitude subscale, (M=38.0), while those who had not attended scored lower (M=37.0). Similarly, those who had attended a nutrition education course also had a higher nutritional practice subscale mean score (M=27.8), while those who had not attended a nutrition education course had a lower mean score (M=26.0). The two groups had a statistically significant difference with respect to nutrition education status ($p<0.05$).

As it is seen in Table 5, there was a significant correlation between the nutritional knowledge, nutritional attitude and nutritional practice subscales of the Nutritional Attitude Inventory administered to students from two different countries ($p<0.01$). The variables were found to be positively correlated. The nutritional attitude subscale had a moderate correlation with nutritional practice (r=0.3) and nutritional knowledge (r=0.4) subscales, while there was a weak significant correlation (r=0.3) between the nutritional practice and nutritional knowledge subscales ($p<0.01$).

Table 5: Correlation between the nutritional attitude inventory subscales according to university students variable

[1-2]*Subscale*			*Practice*	*Attitude*	*Knowledge*
1-2	*Practice*	(r)	1.000	.3	.4
		(p)	-	.0	.0
		df	0	1671	1671
	Attitudes	(r)	.3	1.0	.3
		(p)	.0	-	.0
		df	1671	0	1671
	Knowledge	(r)	.4	.3	1.0
		(p)	.0	.0	-
		df	1671	1671	0

*$p<0.01$ 1: Gazi Faculty of Education Students
2: St. Cloud State University Students

DISCUSSION

This study investigated the differences in nutritional knowledge, attitude and practices between undergraduate students in two different countries. In the study, the researcher found high Cronbach's Alpha values, which measure internal consistency, for the nutritional knowledge, nutritional attitude and nutritional practice subscales. The results of the present study are similar to those reported in past studies (Herzman et al. 2013; Kris-Etherton et al. 2014; Jones et al. 2015).

According to the results by gender variable, female students attending Gazi Faculty of Education had a higher nutritional attitude subscale mean score than male students did. There was a statistically significant difference with respect to gender, according to nutritional attitude. It can be said that female students have positive attitudes towards consuming basic food groups. However, although the nutritional knowledge and nutritional practice subscale mean scores of female and male students were approximate, there was no statistically significant difference. Furthermore, both female and male students attending St. Cloud State University in the United State had high nutritional knowledge and nutritional practice subscale mean scores. There was a statistically significant difference with respect to gender. A review of literature yielded miscellaneous results. Various studies reported high nutritional knowledge and nutritional attitude mean scores for both female and male Turkish undergraduate students (Tutuncu and Karaismailoglu 2013; Ozcan et al. 2014; Ermis et al. 2015; Ozgen 2015) while, in some studies conducted abroad, female students have higher nutritional knowledge and attitude mean scores than male undergraduate students (Hendrie et al. 2008; Yahia et al. 2016; LaCaille et al. 2016). In the present study, the greater mean scores in both countries for female undergraduate students compared to male students could be attributed to their being more interested in the subject than male undergraduate students.

Among Gazi Faculty of Education students, those who had attended a nutrition education course had higher nutritional knowledge and

nutritional attitude subscale mean scores than those who had not attended a nutrition education course. Both groups had a statistically significant difference with respect to nutrition education status. Ermis et al. (2015) concluded that undergraduate students who had attended a nutrition education course had higher nutrition knowledge percentage than those who hadn't attended. Another study conducted by Aslan et al. (2016) stated that although university students attended a nutrition education course, their attitudes and practices didn't change in the positive way.

However, in the nutritional practice subscale, although the mean scores of those who had attended a nutrition education course and those who had not attended were approximate, there was no statistically significant difference. These results reveal that the undergraduate students were informed about the subjects of nutritional attitude and nutrition education, and were aware of the importance of having an adequate, balanced and healthy diet. Among St. Cloud State University undergraduate students, those who had attended a nutritional education course had higher nutritional knowledge, nutritional attitude, and nutritional practice subscale means scores than those who had not attended a nutritional education course. Both groups had a statistically significant difference with respect to nutritional education status. This could be due to increased awareness of St. Cloud State University students on nutritional education with an emphasis on healthy nutrition as part of health protective behavior. In her study on undergraduate students, Harlak (2014) identified consistent behaviors, particularly having breakfast, weight control, sleeping regularly and exercising, for maintaining a healthy diet as a health protective behavior. This difference could be attributed to maintaining a more favorable attitude toward healthy nutrition (for example, not taking tea or coffee with meals, preferring vitamin and mineral rich foods, and eating vegetables with their leaves and roots) with increased nutritional knowledge. Matthews et al. (2016) determined that undergraduate students who had attended nutritional course and health sciences course had positive opinions on nutritional knowledge and diet quality.

Another important finding of the study was the identification of a significant correlation amount of the nutritional knowledge, nutritional attitude and nutritional practice subscales of the Nutritional Attitude Inventory administered to Gazi Faculty of Education and St. Cloud State University students. The variables were found to be positively correlated. The nutritional attitude subscale had a moderate correlation with nutritional practice and nutritional knowledge subscales, while there was a weak significant correlation between the nutritional practice and nutritional knowledge subscales. Ozgen (2015) found that the nutritional knowledge subscale of the student nutritional attitude instrument was positively correlated with the nutritional attitude and nutritional behavior subscales. Barzegari et al. (2011) and Jones et al. (2015) also identified a positive correlation between student nutritional knowledge and nutritional attitude. Huang et al. (2013) found similar results.

The results of the present study are similar to the results reported by these past studies. This result could be associated with the provision of nutritional education in the departments the students from both countries attended, the high number of credits allocated to nutrition courses among public health courses, participation in workshops, and interest in researching and learning about the subject of nutrition. A study conducted in Turkey by Oraman et al. (2014) indicated that few undergraduate students had taken nutritional education courses, most of them did not know how to balance their diet and had an unhealthy nutritional practice.

CONCLUSION

In conclusion, the researcher identified differences in nutritional knowledge, attitude and practice between undergraduate students from two different countries. Gazi Faculty of Education students had higher nutritional knowledge, nutritional attitude, and nutritional practice mean scores than St. Cloud State University students. Similarly, female students were more adequately equipped in nutritional knowledge and attitude than male students. There was a statistically significant difference for both groups in the nutritional attitude subscale between the students who had attended a nutrition education course and those who had not, emphasizing the importance of attending seminars and courses on nutrition.

RECOMMENDATIONS

This study has certain limitations. The following suggestions could be made for future

studies: Notwithstanding the fact that the study does not represent the entirety of the students in Turkey and the US, it could set a precedent for future research. The participants from both countries had adequate nutritional knowledge, attitudes, and practice. With an adequate knowledge of nutrition, nutritional habits and behaviors are more readily developed. Therefore, students' knowledge could be supported with prolonged active instruction on maintaining a healthy diet in order to facilitate the conversion of nutritional knowledge into attitudes and habits.

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