University students' meal experience at the dining hall

Nurhan Ünüsan

Nutrition and Dietetics School of Health Sciences, KTO Karatay University, Karatay, Konya, TURKEY - E-mail: nurhan.unusan@karatay.edu.tr

Summary. *Objective:* The objectives of the study were If BMI is a statistically significant predictor of detailed nutrition facts on menu labels, and to compare and describe the level of satisfaction of the university students' meal experience on meals, preparation, value, service and ambience both in 2016 and 2017. *Material and Method:* The study was carried out in a fully operational dining hall where students book, dine and pay for meals at a foundation University in Konya, Turkey. Both in 2016 and 2017 the level of satisfaction of the University students' meal experience was measured. In 2017, both BMI and nutrition facts measurements were included and the author and 4 other people from the same university was in charge of monthly audit on hygiene, sanitation and nutrition labelling in the dining hall between the application of questionnaires. A self-report questionnaire was developed. The questionnaire consists of two main sections; level of satisfaction on meal experience, calorie and macronutrient level information on restaurant menus. The variables were investigated using Kolmogorov-Smirnov to determine if they are normally distributed. To compare the mean of two groups, gender and years Mann-Whitney U test was used. To compare BMI classifications Kruskal-Wallis test was preferred. Furthermore, the Chi-square test was used to compare the proportions of variables in cross tabulation. *Results:* There is a statistically significant difference when cross-tabulation of macronutrients and total calories with BMI are examined (=21,842; p=0,039<0,05). The majority of students indicated that ambiance was the most satisfied dimension, followed by service, menu, food and food preparation. Not all students notice the macronutrient and calorie information in dining halls. There is neither significant relationship between BMI and meal experience dimensions nor gender and meal experience dimensions (p>0,05). *Conclusions:* This study determined the level of satisfaction that students have with their meal experiences in order to improve the food service provided. The methods can be transferrable to other dining settings, such as schools, hospitals and even workplaces.

Keywords: meal experience, student, dining hall, calorie content, macronutrient content, menu

Introduction

Obesity is an important and highly prevalent public health problem worldwide. In Turkey, the incidence of obesity has increased significantly among adults during the last two decades. In one study, more than 22% of adults in Turkey were classified as obese according to direct measurements of height and weight; accordingly Turkey ranked 10th in this metric among 29 countries in the Organisation for Economic Co-operation and Development (1). One in three people in Mexico, Hungary and the United States and one in four people in England and Finland are obese. Accordingly, obesity has led to increases of 1–3% of total medical spending in many countries, with even higher increases of 5–10% in the United States. Furthermore, the per capita health spending for an obese person is 42% higher than that for a normal weight person (2).

Nelson, Gortmaker (3) defined an increased consumption of high energy foods and reduction in

physical activity as the major causes of overweight and obesity among university students. Furthermore, the consumption of a large percentage of meals away from home has been suggested to significantly affect an individuals' weight. In the United States, approximately 30% of the daily intake of calories are consumed in foods eaten away from home (4), and 95% of young adults (20–29 years old) consume food from any type of restaurant at least once per week (5). Foods purchased away from home tend to be higher in fat, which lead to increases in the body mass index (BMI) values of adults (6). Todd, Mancino (7) indicated that on average, individuals consume an additional 134 calories per meal consumed away from home. Specifically, each dinner, lunch and breakfast consumed away from the home would add 144, 158 and 74 calories, respectively.

The above-mentioned increase in caloric intake among students has been attributed to a lack of knowledge about the calories and macronutrients in purchased meals. Several studies have shown that providing macronutrient and calorie information in dining halls can reduce the number of calories consumed (8, 9). By contrast, other studies demonstrate the inefficacy of menu labelling in this setting and report insignificant differences in the calories consumed by students before and after the implementation of menu labelling (10, 11). However, placing nutrition information at the point-of-selection in a dining hall setting could help students to make informed choices regarding the nutrition contents of various foods. Conklin, Cranage (12) researched this topic within a college environment and reported that students could be influenced by nutrition information when selecting food. Therefore, routine exposure to nutrition food labels at points-of-selection in a university setting may have long-term effects on the knowledge, eating behaviours and weight management practices of young people.

A meal is generally defined as the food served on a plate (13). By contrast, the meal experience is a sum of the food in a meal, as well as the service and ambience that elevate a meal beyond mere appetite satisfaction. Therefore, the meal experience should be understood as the relationship between various categories and subcategories. For example, when eating a meal outside of the home, the experience is specific to the person experiencing the meal, and two people will not have

the same experience (14). For the purpose of this study, satisfaction is defined as the customer's evaluation of a product or service via a subjective comparison of their expectations and the actual performance, which results in customer satisfaction (14). Note that if food production is not correctly monitored, quality attributes may be affected negatively, leading to consumer dissatisfaction.

Most Turkish students regularly consume lunch at the university (15). Therefore, it is necessary to examine the effects of menu labelling laws on university students, as they consume a large number of their daily calories away from home (15). Nutrition labelling schemes at the point of food selection are considered a form of social marketing and often have been used in studies to promote healthful eating among the diners at food service establishments. These environmental strategies increase the likelihood of a behavioural change among people within the targeted population. By examining the effects of menu labels on dining hall menus within a specific university population, researchers could determine the need for further nutrition education interventions to enhance students' understanding of menu labels. Although increasing numbers of studies concerning the effectiveness of menu labels and meal experiences are being conducted in various countries, this study is the first of its kind to be conducted in Turkey.

Material and Methods

The objectives of the study were 2 folds: 1. If BMI is a statistically significant predictor of detailed nutrition facts (calories, fat, carbohydrate, and protein) on menu labels, and 2. to compare and describe the level of satisfaction of the university students' meal experience on meals, preparation, value, service and ambience both in 2016 and 2017.

Research Group

The total population consisted of approximately 4000 in 2016 and 6000 students in 2017 from which the sample was drawn. A stratified random sampling method was used. The sampling method and strategy selected was determined in consultation with the stat-

istician at the department of statistics at the university. Although not all undergraduate students eat at the dining hall, the majority of these students have eaten the food at the dining hall at some time or another.

Design and procedure

The study was conducted in a fully operational dining hall at a university foundation in Konya, Turkey, where students order, dine and pay for their meal. In Turkey, although food and food service settings are controlled periodically by the Ministry of Health, no laws mandate menu labelling in restaurants and dining halls. University students consume more than a quarter of their calories away from home, which underscores the need to evaluate and reduce the number of calories consumed from foods purchased at restaurants (4). This study measured the university students' level of satisfaction with their meal experiences in both 2016 and 2017. Additionally, both BMI and nutrition fact measurements were included to the analysis in 2017. The author and four other staff members from the same university participated in a monthly audit of hygiene, sanitation and nutrition labelling in the dining hall between the administration of questionnaires. Macronutrients (carbohydrates, protein, and fat) and calories in the daily menus were estimated using BeBis 8.1 food analysis software.

Study Instrument

A self-report questionnaire was developed in accordance with a literature review and consultations with students, dining hall managers and cooks. A pilot study of graduate students outside of the targeted study population was used to confirm both the content and face validity of this questionnaire. As a result, a few items were eliminated or altered to ensure that the language was sufficiently clear and more understandable by the subjects. The final survey questionnaire was assessed by expert reviewers to ensure that the content, cognitive and usability standards were met. The questionnaire comprised two main sections: level of satisfaction with the meal experience (Figure 1) and calorie and macronutrient content information on dining hall menus. The questionnaire was compiled and approved by the University ethic committee in 2016. The items were scored using a 5-point type Likert-type scale

(range: highly dissatisfied, 1 to highly satisfied, 5) to ensure more uniform responses and thus facilitate the data analysis. The surveys were administered by the researcher and two assistants. Completion of the survey required 10–15 minutes.

Figure 1. The attributes to measure the level of satisfaction of the University students' meal experience

BMI was calculated as the mass (kg)/height (m)^2 and was used to represent the self-reported BMI. Using World Health Organisation classifications (16), participants were categorised as underweight (<18.5 kg/m^2), normal weight (18.5–24.9 kg/m^2), overweight (25.0–29.9 kg/m^2), obese class I (30.0–34.9 kg/m^2), obese class II (35.0–39.9 kg/m^2) or obese class III (>40.0 kg/m^2).

Statistical analyses

Data were separated in two different groups: students answered the questionnaire in 2016 and after the menu changed 2017. Statistical analyses were performed using the SPSS software version 21. Cronbach's α values were 0,97 and 0,94 in 2016 and 2017 respectively. To compare the mean of two groups, gender and years Mann-Whitney U test was used. To compare
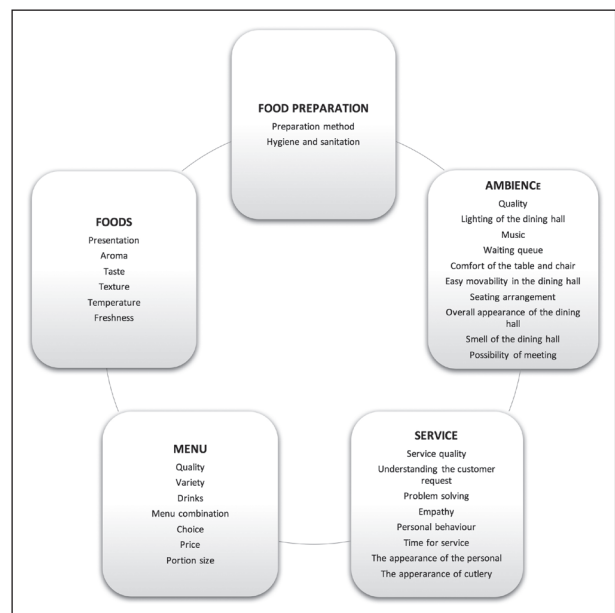

FOOD PREPARATION
Preparation method
Hygiene and sanitation

AMBIENCE
Quality
Lighting of the dining hall
Music
Waiting queue
Comfort of the table and chair
Easy movability in the dining hall
Seating arrangement
Overall appearance of the dining hall
Smell of the dining hall
Possibility of meeting

FOODS
Presentation
Aroma
Taste
Texture
Temperature
Freshness

MENU
Quality
Variety
Drinks
Menu combination
Choice
Price
Portion size

SERVICE
Service quality
Understanding the customer request
Problem solving
Empathy
Personal behaviour
Time for service
The appearance of the personal
The appearance of cutlery

Figure 1: Fatty Acid Distribution in Mushroom Samples

BMI classifications Kruskal-Wallis test was preferred. Furthermore, the Chi-square test was used to compare the proportions of variables in cross tabulation. The variables were investigated using Kolmogorov-Smirnov to determine if they are normally distributed.

Results

Five hundred self-administered questionnaires were distributed in both 2016 and 2017 for the quantitative survey. Of these, 133 and 161 were respectively returned in 2016 and 2017, yielding respective response rates of 26.6% and 32.2%. Overall, the sample was dominated by female respondents, with rates of 87.2% in 2016 and 80.1% in 2017. This was attributed to the heavy female predominance at the university. However, while there was a female predominance among respondents aged 18–21 years, a male predominance was observed among those aged 22 to ≥25 years. Regarding BMI, the majority of university students, 65.5%, were of normal weight, while 21.8% were

underweight, 9.9% were overweight and 2.8% were obese. No students met the criterion for obese classes II and III. The overall mean BMI was 21.29±3.45 kg/m² (min: 16.33 kg/m², max: 34.63 kg/m²). Accordingly, the rate of obesity among university students was lower than that of the normal population in Turkey.

A cross-tabulation of macronutrients and total calories with BMI revealed statistically significant differences (=21.842; p=0.039 and <0.05, respectively). However, gender did not correlate significantly with macronutrients and total calories (p=0.69 and >0.05m respectively). The protein content was the most preferred macronutrient at all BMI levels. As shown in Table 1, 29% of the participants reported concerns about macronutrients and total calories. None of the male students had even noticed the calorie listings. With respect to BMI, all respondents in the overweight and obese class I categories ignored the calorie, carbohydrate and fat data posted on the dining hall counter.

The significance of the meal experience dimensions is presented in Table 2. There is a significant relationship between 2016 and 2017 in all of the di-

Table 1. Cross-tabulation of BMI with total calorie and macronutrients intake at the dining hall

BMI	Total calorie and macronutrients					Total		p
	Calorie	Carbohydrate	Protein	Fat	Don't care			
Underweight	1	2	8	4	7	22		
Normal	12	6	28	6	12	64		
Overweight	0	0	2	0	7	9	21,842	**0,039***
Obese class I	0	0	1	0	2	3		
Total	13	8	39	10	28	98		

*p<0,05

Table 2. The comparison of students' mean scores in 2 years with respect to dimensions of the meal experiences

Dimensions of the meal experiences	Years	N	Median	Mean Rank	Mann-Whitney U	p
Foods	2016	133	17,0000	120,72	7145,000	**0,001***
	2017	148	20,0000	152,46		
Food preparation	2016	133	6,0000	127,95	8106,500	**0,001***
	2017	156	6,0000	159,54		
Menu	2016	133	18,0000	117,00	6650,000	**0,000***
	2017	148	22,0000	162,57		
Service	2016	133	24,0000	129,56	8320,500	**0,010***
	2017	152	25,0000	154,76		
Ambiance	2016	133	26,0000	123,86	7562,500	**0,001***
	2017	147	30,0000	155,55		

* p<0,05

mensions of the meal experience (p<0,05). The majority of students indicated that ambiance was the most satisfied dimension, followed by service, menu, food and food preparation both in 2016 and 2017. There is neither significant relationship between BMI and meal experience dimensions nor gender and meal experience dimensions (p>0,05).

Discussion and Conclusions

Consistent with earlier work by Uluöz (17), normal weight was the most common BMI classification in this study. However, Ergün and Erten (18) and Vançelik, Önal (19) reported lower obesity rates among university students, whereas Avşar, Kazan (20) and Soyuer, Ünalan (21) reported higher BMI values. Notably, students with a normal weight pay more attention to nutrition facts. Many misconceptions regarding carbohydrates and protein have taken hold over time (22). For example, one popular misconception is that one will become fat by eating foods containing carbohydrates. Another misconception suggests that a higher protein content indicates a healthier dietary pattern (22). Thus, the results directly reflect the attitudes held by people towards carbohydrates and protein, which have been influenced by the marketing promotion strategies of the food industry.

The reliance of the present study on self-reported weight and height values for BMI calculations may have affected the accuracy of the findings. Future studies should use better validated data, such as weight and height measurements. However, the study data demonstrate opportunities that could be targeted to improve health among university students. Particularly, measures must be implemented in an attempt to reduce the rates of overweight and obesity in this population. Obesity contributes to the development of chronic diseases such as heart disease, diabetes, stroke and certain types of cancers, all of which are extremely costly. Therefore, interventions must be implemented as early as possible in a person's lifespan to address this growing epidemic.

Not all students noticed the macronutrient and calorie information posted in dining halls. Female students were more likely than males to read nutrition labels, whereas male students selected foods based on taste preferences and an expectation of fullness after eating. These differences were also observed with respect to menu labelling. These findings suggest that menu labels may help to reduce the number of calories selected and thus support the future implementation of federally mandated menu label laws. Although some factors can influence the likelihood of an individual to count calories, this study did not attempt to determine those factors. This would be a useful topic for future research. It would also be beneficial to determine the factors that actually influence menu label usage.

The dining hall meal experience represents a relationship between all five main categories identified in this study and provides an overview from the students' perspective regarding their satisfaction with various aspects of meal experiences. Therefore, this study determined the level of satisfaction of students with their meal experiences with the intent to improve the provided food service. However, as the research aim involved a specific case, the results cannot be generalised to the rest of the population.

Based on these results, ambience can be easily identified as having the greatest effect on student satisfaction (23). The results from this study support previous findings in which the service and ambience dimensions were ranked as more important than the food dimension in terms of the meal experience (24,25). In university residential dining halls, food is prepared in large quantities according to a conventional food service system, using menu items distributed from a central production unit. The subjects seemed to be pleased with the behaviour of the staff employed by the dining hall. Ambience has been shown to have a significant influence on students' dining satisfaction and intent to revisit, as well as their willingness to pay higher costs for food and spread positive reviews via word-of-mouth (26). However, the study also demonstrates that university students were dissatisfied with the attributes of food preparation. Attention should therefore focus on maintaining, rather than improving, these attributes of food preparation.

The highest levels of dissatisfaction were reported for the food preparation method and hygiene and sanitation. Students would obviously prefer better food and menu dimensions. For example, a very large

proportion of foods offered at the dining hall were deep-fried. However, these dissatisfactions could be resolved simultaneously. For example, a varied menu with healthier selections must be implemented to serve a diverse student population, and each dimension of the meal experience could be improved to increase satisfaction among the students. Moreover, a dining hall that has taken steps to ensure student satisfaction may also encourage prospective students who may be considering the university. This study is important because it contributes to the limited body of empirical knowledge regarding university food service providers and demonstrates the level of satisfaction of students with their meal experiences. These data can be used to improve the provided food service.

The findings of this study make a valuable contribution to the existing theory in terms of students' satisfaction with the meal experience. While data was collected in a university dining hall, the methods are readily transferrable to other dining settings, such as schools, hospitals and even workplaces. Results from this study will improve the understanding of food choice in context with social networks, which will allow a more targeted approach to health promotion in dining settings. Additionally, by applying the results it can be said that university dining halls can be more effective in meeting student requirements and attractive to students. Future research should include designing educational programs for the government agencies and marketing communication policies for the restaurant/ dining hall industry.

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Correspondence:
Prof. Dr. Nurhan ÜNÜSAN
Nutrition and Dietetics School of Health Sciences, KTO Karatay University, Karatay, Konya, TURKEY
nurhan.unusan@karatay.edu.tr
nurhanunusan@gmail.com