European Online Journal of Natural and Social Sciences 2022;
Vol.11, No 2 pp. 263-275
ISSN 1805-3602

The Relationship between Calorie Labeling, Weight Concern, and Weight Perception among Females in Saudi Arabia

Tahani Al-Sandal,[1*] Hala Al-Otaibi,[1] and Haiam O. Elkatry [1,2]
[1] Department of Food and Nutrition Science, College of Agricultural and Food Science, King Faisal University, Saudi Arabia; [2] Department of Home Economics, Faculty of Specific Education, Ain Shams University, Egypt
[*]Email: tahani.ths@gmail.com

Received for publication: 19 January 2022.
Accepted for publication: 02 March 2022.

Abstract

The goal of this study was to determine the efficacy of the Saudi Food and Drug Authority (SFDA) initiative by determining whether participants' food selection behavior has changed since calorie information has been listed on restaurant menus, as well as to look into the relationships between calorie information on restaurant menus, body weight, and weight perception in Saudi Arabian women. To carry out a quasi-experimental design, this study used a convenience sample of 333 undergraduate female students with an average age of 20.38±1.77 years. The control group (non-calorie listed menu169, 50.7 %) and the experimental group (calorie listed menu169, 50.7 %) were divided into two groups based on the type of menu used (calorie listed menu164, 49.3 %). When compared to the control group's mean calorie intake, the experimental group's mean calorie consumption reduced by 59 calories, showing a significant difference between the two groups. The presence of calories impacts a greater number of people in the experimental group (64.6%), who have a significantly higher mean weight concern (7.94±3.13) and mean behavioral intention (11.82±4.65) than the control group. Participants in the experimental group who were classed as obese or overweight had the highest level of weight perception and concern, despite significant changes in calorie consumption. In adults, calorie counting has a considerable influence on calorie reduction and weight maintenance. This effort is a useful, low-cost, and easy-to-understand tool, as well as a great place to start for people and communities interested in obesity prevention and reduction.

Keywords: Saudi Food, calorie consumption, calorie labels, weight perception, weight concern, female students

Introduction

Obesity is defined as an abnormal accumulation of fat in the body's tissues that is hazardous to one's health. It's been labeled a chronic condition, and it's a big public health issue (WHO, 2019). It makes you more susceptible to a variety of chronic disorders. Approximately 71 % of deaths globally are caused by these diseases (WHO, 2018). Obesity rates have increased rapidly over the world, nearly tripling between 1975 and 2016. Over 1.9 billion adults were overweight in 2016, with over 650 million people suffering from obesity (WHO, 2018).

If nothing is done to stop the growth of obesity, it is predicted that by 2030, half of the world's population would be overweight or obese (Frederick, 2018).

Over the previous few decades, Saudi Arabia has experienced significant cultural change, resulting in a shift in lifestyle, an increase in obesity to 33.7 percent, and a 68.2 percent increase in

overweight residents (WHO, 2016). Obesity has thus become a huge public health issue. This is due to the widespread availability of restaurants and fast food, which contribute to calorie intake that exceeds daily requirements.

TPB stands for Theory of Planned Behavior (Ajzen, 1991). plays a crucial role in explaining healthy behavior and guiding consumers' intentions and attitudes regarding menu labeling for healthy choices (Kim et al, 2018; Pei, 2018). College life is a transitional period in the lives of undergraduate students, affecting food consumption patterns and perhaps leading to healthy or bad eating habits (Wilson et al, 2018). Adults and adolescents are the subjects of most consumer research, with college students receiving less attention. Female university students, on the other hand, have been reported to make poor eating choices and have greater weight concerns (Abduljawad et al, 2017; Almutairi et al, 2018; Al-Shehri et al, 2019; Neumark-Sztainer et al, 2003). If students are unaware of the nutritional requirements for maintaining a healthy weight, they will make bad dietary choices, raising obesity rates and the incidence of chronic diseases in the future.

Many government projects in Saudi Arabia have evolved in recent decades with the goal of raising public health awareness among individuals and communities. They also discussed the food quality that is essential to help residents minimize obesity and sustain healthy lifestyles.

The Saudi Food and Drug Authority (SFDA) initiative is one of the most current programs, and it coincides with the strategic objectives of Saudi Arabia's 2030 vision. The plan went into effect in early 2019, and all restaurants and coffee shops are required to follow its guidelines. It mandates that all out-of-home food service providers use "calories" or "kilocalories" to clearly indicate the calories in all food products offered to customers (SFDA, 2018a; SFDA, 2018b).

Consumer awareness of calories may improve as a result of repeated exposure to calorie information on restaurant menus, increase public knowledge about eating nutritious foods, aid in calorie reduction, influence people's attitudes and social conventions, and encourage them to pay more attention while ordering meals at restaurants (Cawley et al, 2018; Pei, 2018; Rahamat, 2019). The goal of this study is to see if participants' meal selection behavior has changed once calorie information has been published on menus, in order to assess the effectiveness of the SFDA effort. This study uses the TPB to look at the links between calorie information on restaurant menus, body weight, and weight perception in Saudi Arabian women.

Materials and Methods

Subjects and Study Design

A convenience sample of undergraduate female students at King Faisal University in Al-Ahsa, Saudi Arabia, was employed in this study, which used a quasi-experimental methodology. The sample was calculated using Jakel et al (1996) equation for determining the difference between two independent samples. There were 36 subjects in each group, for a total of 333 observations. Participants were chosen at random from a female campus that represented all colleges. The researchers met with the participants in a campus café and offered them to complete a survey. During brief interviews, the researcher gathered their anthropometric measures (approximately 10 minutes). Food menus with and without calorie information were then assigned to them at random (Figure 1).Participants who were pregnant, had chronic conditions, or were under the age of 18 were not allowed to participate. For lunch, participants were instructed to choose from a menu of options (Figure 2). As a result, individuals who consented to fill out the questionnaire were told that their information would be kept private and used exclusively for research purposes. The survey utilized in study #53552 was authorized by King Faisal University's Research Ethics Committee.

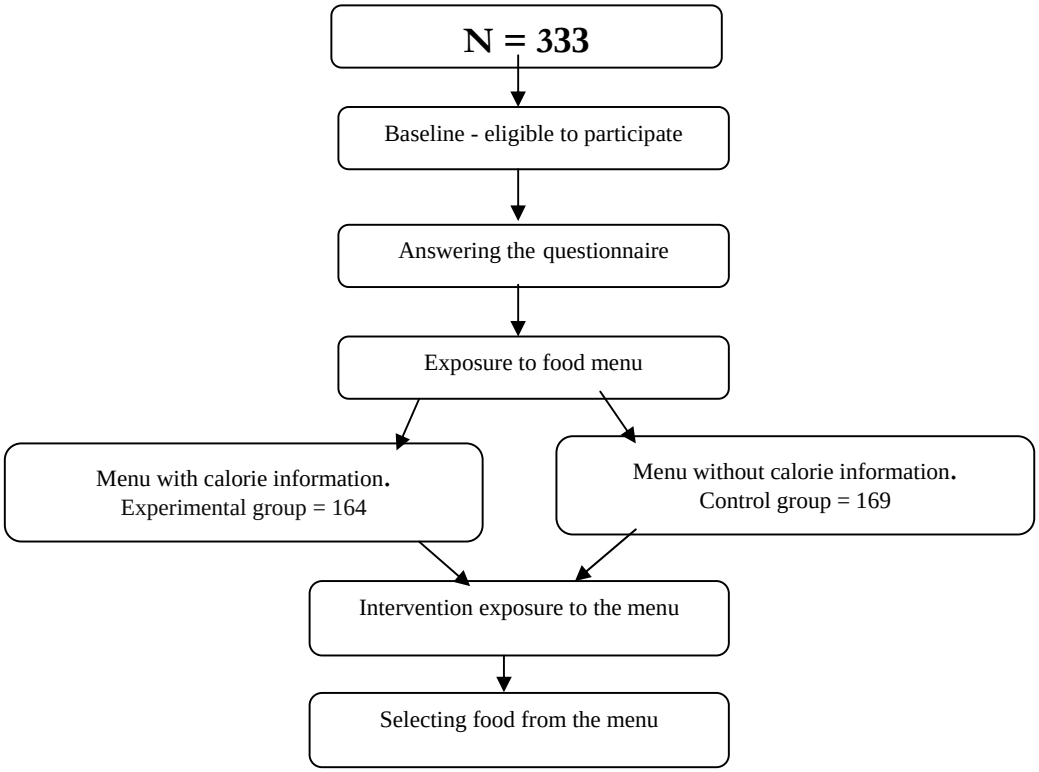

Figure 1. Study Design

Methodology

Menu: On Wednesdays, the university eateries on the female campus served two menus with a total of 12 food items for lunch. This is owing to the wide range of foods and cuisines presented. In terms of shape, size, and format, both menus were created in the same manner. The first menu, on the other hand, only had non-calorie products, but the second menu had calorie-counted goods (Figure 2). Prices were not provided on the menus since they could skew the choices of the participants.

Questionnaire: The following six sections comprised the questionnaire:

1) Social and economic information: Marital status and household income on a monthly basis.

2) Body measurements: All subjects were measured by the researcher. Without the use of shoes, height was measured with a meter (Seca). An electronic digital scale was used to determine weight in kilos (OMRAN HN286). Body mass index (BMI) is determined using weight (kg) and height (m2) as inputs (WHO, 1998).

3) Calorie information on restaurant menus: Participants were asked if they saw any calorie information on restaurant menus and if it influenced their item choices. In addition, participants were asked a series of questions to see how the presence of calorie information affected their food choices. This was with four options: ordering a smaller dinner (Cronbach's alpha=0.72), ordering a larger meal (Cronbach's alpha=0.72), ordering a larger meal (Cronbach' (Larson et al, 2018; Rahamat, 2019).

4) Weight perception: Participants were asked a single question to assess their perceptions of their weight. This includes questions about participants' weight perceptions (e.g., how would you

describe your weight?). Participants were given four choices, one of which was "ideal weight," and their responses were compared to their actual BMI.

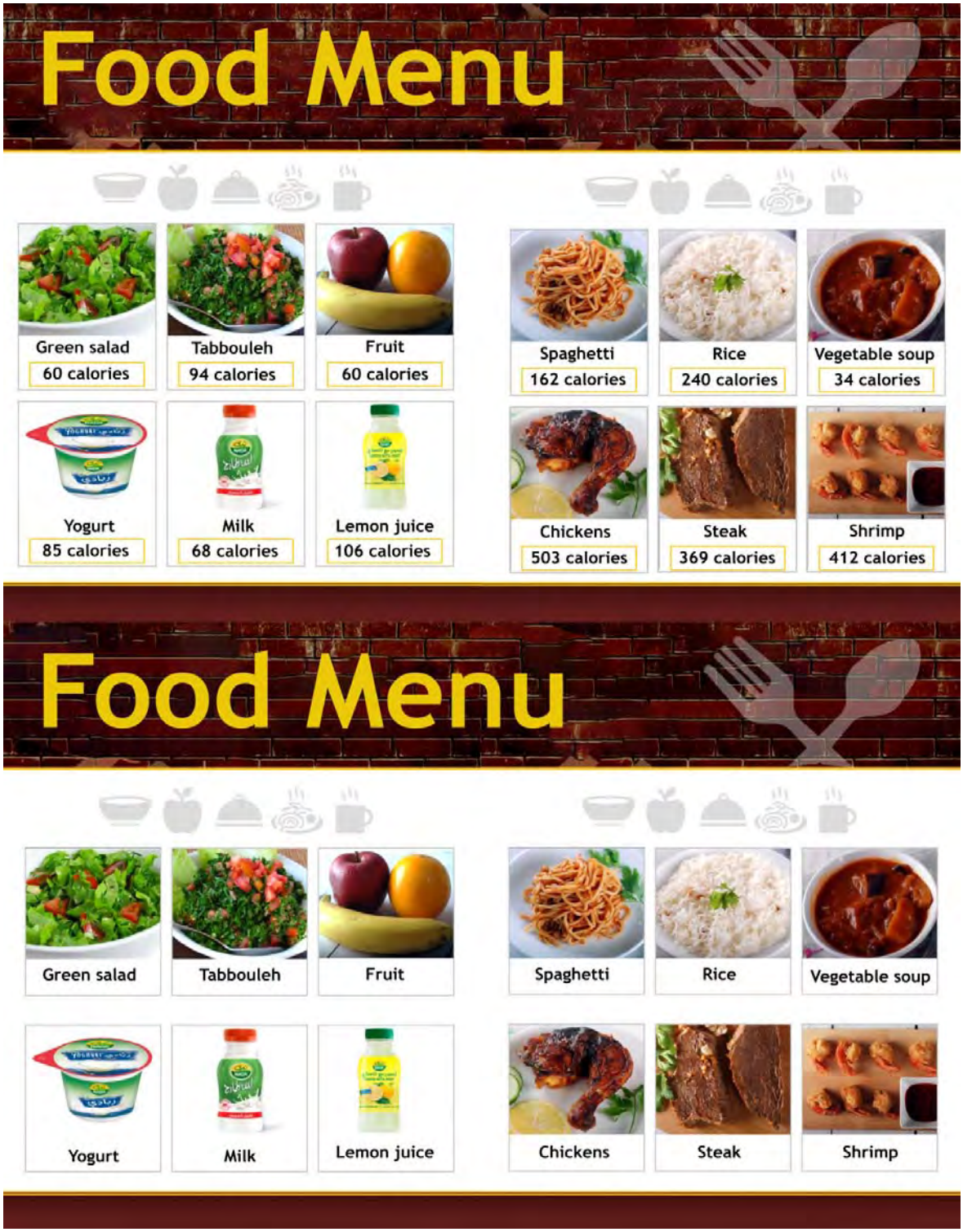

Figure 2. Menus without and with calorie information

5) Weight concern: Participants were rated on three weight-related comments, such as "I am concerned about gaining weight." Participants' agreement with these assertions was determined by selecting one of four options: strongly disagree=1, strongly disagree=2, agree=3, and strongly agree=4. They were more concerned as the value increased. Cronbach's alpha is equal to 0.84 (Larson et al, 2018; Neumark-Sztainer et al, 2003).

6) TPB Components: This section had four questions about subjective norms, such as "My healthy restaurant menu choice assists me to maintain my weight." Three questions about the participants' attitudes were also posed. "Eating low-calorie foods keeps my body in good shape," for example. In addition, four questions about the individuals' behavioral objectives were posed. "I want to make healthier menu choices at restaurants," for example (Jun et al, 2014; Kim et al, 2018). A 5-point Likert scale was used in each of them (strongly disagree=1, disagree=2, neutral=3, agree=4, strongly agree=5). Positive attitudes, intentions, and readiness to pick low-calorie foods were associated with the highest values. The items' dependability (Cronbach's alpha) was greater than 0.7, which was considered satisfactory.

Data Analysis

SPSS was used to examine the collected data (version 23.0). An independent t-test (for differences between means), as well as a Chi-Square test, were used to assess hypotheses (for independence of categorical variables), and ANOVA test. Furthermore, the relationship between calorie consumption and BMI was examined as was the relationship between calorie intake, weight perception, and weight concern.

Results

Sample Description

A total of 333 female students were included in the study. They were divided into two groups at random based on the type of menu used. The control group (with the non-calorie labeled menu) had 169 people in it, accounting for 50.7 % of the total sample size. The experimental group had 164 participants, accounting for 49.3 % of the total sample size. The participants' average age was 20.38±1.77 years. The majority of those who took part were single (81.4%) and had monthly household incomes of more than 5000 riyals (71.1 %).

The sample consisted of 333 female students. They were divided randomly into two groups according to the type of menu used. The control group (with the non-calorie listed menu), comprised 169 participants and represented 50.7% of the sample size. The experimental group comprised 164 participants and represented 49.3% of the sample size. The mean age of the participants was 20.38±1.77 years old. The majority of participants were unmarried (81.4%), and had monthly household incomes exceeding 5000 riyals (71.1%).

Calories, Anthropometric Measurements, Weight Concern, and Weight Perception

Table 1 reveals that the experimental group's mean calorie intake was 59 calories lower than the control group's mean calorie intake, indicating a significant difference between the two groups. It was discovered that the mean BMI for the two groups was nearly identical, with no significant differences between them. Furthermore, it was found that more than half of the subjects in the experimental group were influenced by the calories listed on the menu when placing their orders. However, the addition of calories had no effect on 63.3 % of the control group, but had an effect on 64.6 % of the experimental group (p=0.000). As a result, 18% of the experimental group would order their usual foods without consulting the calorie count. However, if the meal was rich in calories, 24.2 % of the control group would not order it. The results show that more than half of both groups believe that women need 2,000 calories per day. The percentage of the participants in the control

group who described themselves as being of normal weight was approximately equal to those in the experimental group who believed that they were overweight. The mean of weight concern in the experimental group was higher than in the control group.

Table 1. Calories, anthropometric measurements, weight concern, weight perception, and TPB between groups

Variables	Control group 169 (50.7%)	Experimental group 164 (49.3%)	P
Calories (Mean±SD**)**	585.20±233.41	526.10±205.02	0.015*$
Weight/ kg (Mean±SD**)**	54.40±11.10	54.02±10.37	0.752$
BMI kg/m^2 (Mean±SD**)**	22.04±4.12	21.93±4.14	0.815$
BMI categories			
Underweight	33 (19.5%)	36 (22%)	0.882#
Normal	99 (58.6%)	89 (54.3%)	
Overweight	29 (17.2%)	30 (18.3%)	
Obese	8 (4.7%)	9 (5.4%)	
Have you noticed any calorie information while purchasing a meal or snack in any type of restaurant?			
Yes	134 (79.3%)	137 (83.5%)	.000**#
No	35 (20.7%)	27 (16.5%)	
Did you use that calorie information when deciding what to order?			
Yes	62 (36.7%)	106 (64.6%)	.000**#
No	107 (63.3%)	58 (35.4%)	
How did you use that calorie information when deciding what to order?			
1- Avoided ordering high-calorie menu items.	4 (6.5%)	3 (2.8%)	.000**#
2-Sometimes I do not order high-calorie food.	15 (24.2%)	20(19%)	
3-Decided on a smaller portion size.	18 (29 %)	64 (60.2%)	
4- I ordered my regular meal. Calories do not affect me.	25 (40.3%)	19(18%)	
Women's daily calorie needs are:			
1- 1,800 calories	49 (29.0%)	56 (34.2%)	0.597#
2- 2,000 calories	106 (62.7%)	95 (57.9%)	
3- 2,500 calories	14 (8.3%)	13 (7.9%)	
How do you describe your weight?			
Underweight	46 (27.2%)	26 (15.9%)	0.008*#
Ideal	64 (37.8%)	58 (35.4%)	
Overweight	53 (31.4%)	63 (38.4%)	
Obese	6 (3.6%)	17 (10.3%)	
The mean of general weight concern	6.72±2.98	7.94±3.13	0.000** *$
TPB			
Subjective norms (Mean±SD)	15.98±2.73	15.87±2.85	0.705
Attitudes (Mean±SD)	10.56±2.29	10.30±2.50	0.317
Intention (Mean±SD)	10.62±4.88	11.82±4.65	0.022*
# Chi-Square Test، $ T Test T، ***P<0.0001,**P<0.001، *P<0.05			

TPB and its Relationship with Calories

In both groups, the means of subjective norms and attitudes were quite close, with no significant difference, as shown in Table 1. The experimental group, on the other hand, had a much greater mean in behavioral intention. The study's findings revealed that the sample's subjective norms about calorie disclosure in menus were high and positive. Their attitudes and behavioral intentions, on the other hand, decreased.

The Relationship Between Calories and BMI in the Two Groups

Statistical analysis (ANOVA) was used to identify if there was a significant difference in the mean BMI of each group. Table 2 shows that there were no significant differences for both groups. However, those who were classified as obese consumed the highest average calories, in both groups, especially in the control group.

Table 2. Results of the ANOVA Test for BMI of the two groups

BMI	Control group 169 (50.7%)	P	Experimental group 164 (49.3%)	P
Underweight	609.39±212.44	0.380	475.19±199.83	0.151
Normal	565.93±231.08		544.13±202.06	
Overweight	590.82±268.74		504.36±208.38	
Obese	703.37±201.67		624.0±217.64	

ANOVA test was used to find the significant differences between weight perception and weight concern for each group according to the BMI categories. It was found that there was a high significant difference (p=0.000) between weight perception and the true weight of both groups.

In the control group, the participants with normal weight and obesity recorded the highest level of weight perception. On the contrary, those who were classified as obese and overweight recorded the highest level of weight concern, and the highest mean for calorie consumption with no significant difference, as shown in Table 3.

In the experimental group, the participants who were classified as obese and overweight recorded the highest level of weight perception and concern, and there were significant differences in calorie intake as revealed by Table 4.

Table 3. The relationship between weight perception, weight concern, and its effect on calorie intake among the control group

weight perception	weight concern	P	calories	p
My weight is low	3.80±1.36	0.000**	588.0±225.99	0.380
Underweight (54.3%)				
Ideal (45.7%)				
Overweight (0%)				
My weight is perfect	6.23±2.36		581.7±223.32	
Underweight (10.9%)				
Ideal (82.8%)				
Overweight (6.3%)				
I am overweight	9.45±1.87		574.09±256.39	
Underweight (1.9%)				
Ideal (47.2%)				

weight perception	weight concern	P	calories	p
Overweight (43.4%)				
Obese (7.5%)				
I have obesity	10.16±1.16		698.83±204.51	
Overweight (33.3%)				
Obese (66.7%)				
***P<0.0001				

Table 4. The relationship between weight perception, weight concern, and its effect on calorie intake among the experimental group

weight perception	weight concern	P	calories	p
My weight is low	4.57±1.92	0.000**	524.65±203.94	0.41*
Underweight (41.7%)				
Ideal (52.8%)				
Overweight (5.5%)				
My weight is perfect			518.03±195.55	
Underweight (12.4%)	6.62±2.60			
Ideal (42.7%)				
Overweight (42.7%)				
Obese (2.2%)				
I am overweight	9.57±2.31		537.26±212.45	
Overweight (73.3%)				
Obese (26.7%)				
I have obesity	11.58±0.71		560.11±226.71	
Ideal (11.1%)				
Overweight (11.1%)				
Obese (77.8%)				
*P<0.05, ***P<0.0001				

Discussion

Similar to prior nutrition research, it was discovered that showing calories on menus had a significant impact on reducing the experimental group's mean calorie consumption by 59 calories when compared to the control group. This could be due to the high calorie content of the foods served to the test group. This has resulted in the selection of lower-calorie or fewer-calorie foods, which is consistent with the findings of Krei et al (2019) According to Zlatevska et al. (2018), putting calories on menus reduced consumption by 27-67 calories each meal.

When asked, "Have you seen the calories stated on restaurant menus?" the percentage of those who had observed them was about 20% in both groups, which is consistent with Cawley et al. and Rahamat's findings (Cawley et al, 2018; Rahamat, 2019). Furthermore, calorie counts on menus are a new trend in the community that is gaining traction. This could explain or contribute to the effect of decreased calorie consumption in the experimental group, which was ordered from a different menu than the control group.

Despite the fact that the control group had a high rate of calorie observation, the majority of participants were unaffected by the calories listed, which is in line with a study by Olivera et al. (Oliveira et al, 2017), which found that most Brazilian groups were unaffected by calorie informa-

tion during item selection. This was owing to their lack of understanding of how to use and benefit from calorie information, as well as their inability to read and interpret calorie information. Some participants stated that nutritionists and people who are concerned about their weight should know about calories. Furthermore, some participants feared that focusing on calories would hinder them from really appreciating their meals.

The results demonstrate that when choosing from the menu, two-thirds of the participants in the control group were unaffected by the calorie list. They chose foods that they were familiar with or that they wanted to consume without considering the calories. However, nearly a quarter of the control group would occasionally substitute a lower-calorie meal for a higher-calorie one.

This is consistent with past research (Loureiro & Rahmani, 2016; Rahamat, 2019). Seyedhamzeh et al. (Seyedhamzeh et al, 2017) discovered that a variety of factors influence food item selection, including flavor, price, culture, and food awareness. As a result, calories have only a minor impact on food selection. Taste (43 percent), nutritional value (20 percent), hunger (19 %), price (10 %), and calorie content (10 %) were the most important criteria for customers when choosing a meal, according to Robertson and Lunn (Robertson & Lunn, 2019). (8 %).

Another study by Avcibasioglu et al. (Avcibasioglu et al, 2011) found that while calorie information influenced a large majority of students when ordering a meal, they were also influenced by other factors. The first element influencing their decision was price (78 %), followed by the meal's ingredients, and finally the meal's size. Calories came in fourth place, since they impacted only one-third of the students in the sample (30%) when picking their meals.

The placement of calorie information on a menu is one of the reasons why society is not engaged in or affected by calorie reading. The calorie information is frequently set out to the far right of the item's name, as Americans read from left to right. This results in a lack of desire to read calories. Calories were written on the left (in the same direction as writing the item) in a field trial, and this lowered calorie consumption by 16.31%. This indicates that the placement of calorie information on a menu has an impact on consumer choices (Dallas et al, 2019).

The majority of the participants were aware of women's daily calorie requirements. The right response, 2,000 calories, was chosen by about two-thirds of the control group and more than half of the experimental group. However, about a third of participants in both groups chose lower calories (1,800 calories), which contradicted findings from a study conducted at the University of Croatia by Krei et al. (Krei et al, 2019), in which 53.7 % of the experimental group and 44.8 % of the control group correctly answered the question.

Furthermore, more than a third of both groups overestimated daily calorie needs, which could be because the study sample was well aware of the calories to be ingested daily but was unaffected by the amount of calories listed on the menus since they did not know how to use calorie information.

Alternatively, it's possible that they've noticed the remark (that a person's daily calorie need is 2,000) that the food authority has recently required food providers to include on all menus.

We also discovered that almost 40% of the control group thought their weight was normal, but a similar percentage of the experimental group thought they were overweight, which contradicted a study by Lillico et al (Lillico et al, 2015). In that study, three-quarters of the participants thought they were at a healthy weight before and after counting calories in the cafeteria. This disparity could be explained by their lower mean weight worry compared to the current study's mean weight concern, particularly in the experimental group.

In terms of TPB elements, the findings revealed that the mean of both subjective norms and attitudes regarding calories listed in menus were similar in both groups. The experimental group, on

the other hand, had a higher mean for behavioral intention. This is in contrast to Pei's (Pei, 2018) study, which found lower mean values for the TPB elements. Differences in age and gender, as well as varied statements used to measure TPB elements, contributed to the lower averages.

The subjective norms of the sample in respect to the utilization of calories in menus were found to be high and positive in the current study. The level of attitudes and behavioral intention, on the other hand, has decreased. The cognitive dissonance theory, which holds that a person's actions contradict his or her beliefs, could explain this disparity (Festinger & Carlsmith ,1959).

The experimental group's calorie consumption was lower than the control group's in all BMI categories, which was related to the presence of calories in the menu. Obese people, on the other hand, ordered meals with more calories in both groups. This was in line with Larson et al, (2018) findings, which showed that participants who were classed as overweight consumed more calories than those who were not.

In contrast, a research by VanEpps et al. (VanEpps et al, 2016) found that people who were obese consumed fewer calories than those who were overweight. Participants who were categorised as thin or normal weight ordered more calorie-dense meals than those in the other two categories. These findings could be ascribed to the fact that some participants were enrolled in weight-loss programs or to participant self-reporting inaccuracies.

The control group had the highest level of weight perception and an average level of anxiety, according to the results of the study. In contrast, those classified as obese in both groups, particularly in the experimental group, exhibited considerable weight anxiety, which was consistent with Larson et al (2019) findings. Furthermore, there is a link between weight and anxiety, and although obese people were more likely to have a high weight perception, they were found to order the most calorie-dense meals (Avcibasioglu et al. 2011) came to the same result.

Despite their high anxiety, those labeled as obese and overweight in the experimental group had a mean calorie intake that was similar to the rest of the BMI categories in the same group, which could be attributable to their low weight perception. Weight perception is a crucial prerequisite for weight management, and it helps to alleviate excessive weight anxiety. This can help increase behavioral intention to make healthy weight-loss decisions including eating low-calorie foods, getting more exercise, and paying attention to program messages and activities (Haynes et al, 2018).

There are certain limitations to the current study. Because the sample is limited to university students, it may not represent all elements of Saudi society. As a result, the findings cannot be applied to the entire population. Furthermore, we did not include the remark (adults require an average of 2,000 calories per day, with individual calorie demands varying) on the calorie-listed menu, as required by the food and drug administration program.

Because of the range of menu items that we would have ended up with, such as sandwiches, pastries, and other products in the university cafeteria, the study menu was restricted to university restaurant items exclusively in order to test the sample's knowledge of women's daily calorie needs.

Despite these flaws, the current study has certain advantages. Personal interviews were used to gather data and anthropometric measurements, which served to build credibility and guarantee that the responses were accurate. This also decreases the number of inaccuracies that may occur as a result of female students failing to precisely state their weight and height. The TPB was also utilized to monitor and forecast customer behavior. As a result, the research contributes to the activation and development of the SFDA's calorie-listing strategy and drawing the public's attention to its messaging.

Conclusions

The study's main finding is that calorie labels on food menus have an effect because there was a definite 59-calorie difference in calorie consumption between the control and experimental groups. Calorie counting has a substantial impact on calorie consumption reduction and helping people to keep a healthy weight. Although the experimental sample only lost 59 calories each meal, the effect could be bigger if monitored over a longer period of time or with at least two meals per day. According to Guth (2014), cutting 50 calories per day from one's daily diet would result in a calorie intake reduction of 2.27 kilograms per year. This amounts to about 3% of the average person's weight. This effort is a useful, low-cost, and easy-to-read tool, as well as a good start for individuals and societies that want to promote obesity prevention and reduce its spread.

References

Abduljawad, N. N., El-Nashar, N. N., & El-Tahan, N. R (2017). Fast food consumption and its association with obesity among female collegestudents in AL-Medina Al-Munawarh, Saudi Arabia. *Int. J. Adv. Res.* 5(9), 1478-1487.

Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, *50*(2), 179-211.

Almutairi, K. M., Alonazi, W. B., Vinluan, J. M., Almigbal, T. H., Batais, M. A., Alodhayani, A. A., Alsadhan N., Tumala, R., Moussa, M., Aboshaiqah, A,.& Alhoqail, R. I. (2018). Health promoting lifestyle of university students in Saudi Arabia: a cross-sectional assessment. *BMC public health*, *18*(1), 1-10.

Al-Shehri, H. M., Al-Qahtani, A. M., Shaikh, I. A., Hassan, M. A., Al-Qahtani, N. S., Al-Qahtani, A. M., & Alabas, M. A. (2017). Assessment of lifestyle and eating habits among undergraduate students in Najran University, Najran, Saudi Arabia. *International Journal of Medical Science and Public Health*, *6*(3), 638-647.

Avcibasioglu, P., Cardinale, J., Dommeyer, C. J., Lebioda-Skoczen, V., & Schettig, J. L. (2011). An Exploratory Investigation Of College Students Attitudes Toward Californias New Menu-Labeling Law. *Journal of Applied Business Research (JABR)*, *27*(1).

Cawley, J., Susskind, A., & Willage, B. (2018). The Impact of information disclosure on consumer behavior: Evidence from a randomized field experiment of calorie labels on restaurant menus. *National Bureau of Economic Research.* (No. w24889).

Dallas, S. K., Liu, P. J., & Ubel, P. A. (2019). Don't count calorie labeling out: Calorie counts on the left side of menu items lead to lower calorie food choices. *Journal of Consumer Psychology*, *29*(1), 60-69.

Festinger, L., & Carlsmith, J. M. (1959). Cognitive consequences of forced compliance. *The journal of abnormal and social psychology*, *58*(2), 203.

Frederick, A. M., (2018). Obesity. *Orthopedic Clinics of North America*. (49)3.

Guth, E. (2014). Healthy weight loss. *Jama*, *312*(9), 974-974.

Haynes, A., Kersbergen, I., Sutin, A., Daly, M., & Robinson, E. (2018). A systematic review of the relationship between weight status perceptions and weight loss attempts, strategies, behaviours and outcomes. *Obesity Reviews*, *19*(3), 347-363.

Jekel, J. F., Elmore J. G. and Katz, D. L. (1996). Epidemiology biostatistics and prevention medicine. *W. B. Saunders*. pp: 160-169.

Jun, J., Kang, J., & Arendt, S. W. (2014). The effects of health value on healthful food selection intention at restaurants: Considering the role of attitudes toward taste and healthfulness of healthful foods. *International Journal of Hospitality Management*, *42*, 85-91.

Kim, H., Kim, Y., Choi, H. M., & Ham, S. (2018). Relationships among behavioral beliefs, past behaviors, attitudes and behavioral intentions toward healthy menu selection. *Nutrition research and practice*, 12(4), 348-354.

Krešić, G., Liović, N., & Pleadin, J. (2019). Effects of menu labelling on students′ food choice: a preliminary study. *British Food Journal*.

Larson, N., Haynos, A. F., Roberto, C. A., Loth, K. A., & Neumark-Sztainer, D. (2018). Calorie labels on the restaurant menu: is the use of weight-control behaviors related to ordering decisions?. *Journal of the Academy of Nutrition and Dietetics*, *118*(3), 399-408.

Lillico, H. G., Hanning, R., Findlay, S., & Hammond, D. (2015). The effects of calorie labels on those at high-risk of eating pathologies: a pre-post intervention study in a University cafeteria. *Public Health*, *129*(6), 732-739.

Loureiro, M. L., & Rahmani, D. (2016). The incidence of calorie labeling on fast food choices: A comparison between stated preferences and actual choices. *Economics & Human Biology*, *22*, 82-93.

Neumark-Sztainer, D., Wall, M. M., Story, M., & Perry, C. L. (2003). Correlates of unhealthy weight-control behaviors among adolescents: implications for prevention programs. *Health psychology*, *22*(1), 88.

Oliveira, R. C. D., Fernandes, A. C., Proença, R. P. D. C., Hartwell, H., Rodrigues, V. M., & Fiates, G. M. R. (2017). Preferences for menu labelling formats of young adults in brazil and in the united kingdom. *Revista de Nutrição*, *30*, 321-332.

Pei, L. (2018). A pilot investigation to healthy menu selection attitudes and behaviors among restaurant consumers. *Journal of Hotel and Business Management*, 7(2), 1-7, 2169-0286.

Rahamat, S. (2019). Influence of Malaysian consumers' intentions and use of menu labeling on purchase behavior.

Robertson, D. A., & Lunn, P. (2019). *The effect of spatial position of calorie information on choice, consumption and attention* (No. 615).

[Saudi Food and Drug Authority. (2018a). An educational guide on how to calculate calories in meals. [cited Feb 8, 2019]. Available from: https://www.sfda.gov.sa/ar/awareness/Campaigns/Documents/Guide-Restaurants-Cafes.pdf

Saudi Food and Drug Authority. (2018b). A guide to clarify the most important requirements for the regulation of placing calories in the list of meals for food establishments that provide food to the consumer outside the home. [cited Feb 8, 2019]. Available from: https://www.sfda.gov.sa/ar/awareness/articles/Documents/calories.pdf

Seyedhamzeh, S., Bagheri, M., Keshtkar, A. A., Qorbani, M., & Viera, A. J. (2018). Physical activity equivalent labeling vs. calorie labeling: a systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity*, *15*(1), 1-13.

VanEpps, E. M., Roberto, C. A., Park, S., Economos, C. D., & Bleich, S. N. (2016). Restaurant menu labeling policy: review of evidence and controversies. *Current obesity reports*, *5*(1), 72-80.

Wilson, C. K., Matthews, J. I., Seabrook, J. A., & Dworatzek, P. D. (2017). Self-reported food skills of university students, 108, 270-276.

World Health Organization. (1998). "Obesity: Preventing and Managing the Global Epidemic. Report of a World Health Organization Consultation on Obesity," WHO, Geneva.

World Health Organization. (2016). Saudi Arabia Diabetes country profiles. [cited Jan 10, 2019]. Available from: https://www.who.int/diabetes/country-profiles/sau_en.pdf

World Health Organization. (2018). Obesity and overweight. [cited Jan 30, 2019]. Available from: https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight

World Health Organization Eastern Mediterranean. (2019). Obesity. [cited Jan 30, 2019]. Available from: http://www.emro.who.int/health-topics/obesity/68

Zlatevska, N., Neumann, N., & Dubelaar, C. (2018). Mandatory calorie disclosure: a comprehensive analysis of its effect on consumers and retailers. *Journal of retailing*, *94*(1), 89-101.