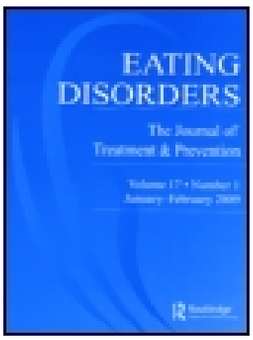

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Is Ramadan fasting correlated with disordered eating behaviours in adolescents?

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ABSTRACT

This study aimed to examine the cross-sectional relationship between Ramadan fasting as a spiritual factor with prolonged hunger and disordered eating behaviors. The study was conducted in June 2016 (11th–29th days of Ramadan) and consisted of 238 fasting and 49 non-fasting adolescents. Risk of disordered eating was evaluated using the Eating Attitudes Test-26 (EAT-26) and Three Factor Eating Questionnaire-R18 (TFEQ-R18). Body image dissatisfaction was rated with Stunkard's Figure Rating Scale (FRS). Nutritional status was assessed using a 24-hour dietary recall. There was no significant difference between energy intake, EAT-26 and TFEQ-R18 scores (except the emotional eating subscores) between the groups. FRS revealed that the comparisons of their "ideal" and self were not significantly different between the groups whereas the gap between the figures they think healthy and closest to self was significantly higher amongst non-fasting adolescents. Two-hundred and two (97.5%) adolescents reported fasting for religious purposes whereas only 8 (3.4%) for losing weight. The EAT-26 total scores were in the pathological range in 39 (16.8%) adolescents who fasted for religious purposes. This study suggests that motivation of adolescents to fast during Ramadan was due to spiritual decisions rather than weight control or other factors and Ramadan fasting was not correlated with disordered eating behaviors or body image dissatisfaction.

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Yasemin Düzçeker designed the study, drafted the initial manuscript, collected the data and approved the final manuscript as submitted. Sinem Akgül designed the study, reviewed and revised the manuscript, conducted the English Language editing and approved the final manuscript as submitted. Yaşar Durmaz and Melek Yaman collected the data and approved the final manuscript as submitted. Sine Örs took the dietary recalls, calculated the calories and approved the final manuscript as submitted. Zeynep Tüzün carried out the certain statistical analyses, reviewed and revised the manuscript and approved the final manuscript as submitted. Zehra Büyüktuncer designed the study, reviewed and revised the manuscript and approved the final manuscript as submitted. Nuray Kanbur designed and supervised the study, critically reviewed and revised the manuscript and approved the final manuscript as submitted.

Clinical Implications

- Ramadan fasting was not correlated with disordered eating behaviors.
- According to the study body image dissatisfaction did not affect the decision to fast during Ramadan.
- According to the adolescents' self-report, their motivation to fast was due to spiritual decisions rather than for weight control.

Introduction

During the past-half century, especially in the Western world, interesting contradictions concerning eating regulation have been discussed. Increases in body image concerns and restricted eating (Boutelle, Neumark-Sztainer, Story, & Resnick, 2002; J. K. Thompson & Stice, 2001) have emerged, yet at the same time, a dramatic increase in overweight and obesity is being witnessed (Ogden, Yanovski, Carroll, & Flegal, 2007; Polivy & Herman, 2004). Eating disorders and obesity are part of a range of weight-related problems and the evidence suggests that these disorders have both shared and distinct risk factors. Adolescents may suffer from more than one disorder or may progress from one problem to another at varying degrees of severity (Day, Ternouth, & Collier, 2009).

Genetic, biological, developmental, social, familial and psychological risk factors play a role in the development of eating disorders (Striegel-Moore & Bulik, 2007). The emergence of eating disorders in non-Western societies as well as Western societies, may be related to the exposure of media which encourages and glamourizes thinness (Groesz, Levine, & Murnen, 2002; Willinge, Touyz, & Charles, 2006). Furthermore, several studies have shown that both ethnic and cultural differences influence the way a person perceives his/her body image and ideal body weight. The role of sociocultural factors is an important research area in the pathogenesis of eating behaviors (Groesz et al., 2002).

Eating behaviors can also vary depending on various motivational factors and may include healthy eating, restricted eating or uncontrolled eating, and may be associated with disordered eating which may lead to eating disorders, obesity, or a combination of both. Some people remain thin while maintaining a healthy relationship with food without restrictive dieting practices. Thus, attention should be focused on, not only what people eat but also why they eat. It is argued that the underlying motivation for consuming food may primarily be satisfying hunger cues or may be responses to emotional, social, or environmental prompts. (S.R. Hawks, Merrill, Gast, & Hawks, 2004; Willinge et al., 2006).

Religiosity or spirituality may also be discussed as a motivational factor related to the individuals' eating behaviors. Fasting is a practice that exists in almost all religions in different ways and frequencies. There are many

examples of fasting in Christianity and Judaism. A well known example is the "Yom Kippur" which is on the tenth day of the seventh month according to the Jewish calendar, and in which eating and drinking is forbidden for approximately 25 hours. Ramadan fasting in Islam is different from Christian or Jewish fasting. Ramadan is the 9th month of the Islamic lunar calendar, and fasting during this month is considered a pillar of the Islamic faith. Fasting during Ramadan (29–30 days) means abstaining from all food, drinks, supplements, tobacco/substance use, and sexual intercourse from sunrise until sunset on a daily basis for the duration of the month. Since lunar calendar is 10–11 days shorter than the Gregorian calendar, Ramadan comes onto different seasons and the duration of fasting varies by approximately 9–21 hours depending on the geographical location and the season.

Islamic rules instruct that healthy Muslims fast during the month of Ramadan after menarche in females and onset of physical characteristics of puberty in males. The purpose of this fasting is to regulate self-control of individuals' behaviors, as well as empathy for less privileged.

The number of meals during Ramadan decreases to two, the iftar which is eaten after the sun goes down (dinner after a prolonged- day long fasting) and the sahur which is eaten just before sunrise (very early breakfast). According to Islamic teachings, iftar is not meant to be a feast, instead the recommendation is to break fast with dates, followed by a regular meal and to eat in moderation. This has changed over the years, and now has become a festive event.

Iftar meals are usually a time for family and friends to come together and celebrate their breaking of fast. These meals tend to have a much larger variety of food than usual dinners and are frequently prepared like a feast. In this aspect, it is different from intermittent fasting as a way of dieting for weight loss. Changes in physical activity and sleep patterns are also experienced due to fasting during daytime and the shift of meal times to night hours.

Fasting during Ramadan and eating rituals at iftar and sahur in Muslim societies may constitute a model to examine the motivational factors, including body image concerns that affect eating behaviors in fasting adolescents. This study aimed to determine why adolescents fast during Ramadan and to examine the cross-sectional relationship between Ramadan fasting as a spiritual factor with prolonged hunger and disordered eating behaviors.

Methods

This study was conducted between June 16th and July 4th 2016 (between 11th and 29th days of Ramadan). Patients were recruited from Hacettepe University Ihsan Doğramacı Children's Hospital Adolescent Outpatient Clinic and Kütahya Dumlupınar University Pediatric Outpatient Clinic,

Turkey when they came in for well-child visits. Participation was voluntary with no financial compensation. The study and control groups consisted of fasting and non-fasting adolescents during Ramadan. The participants were between the ages of 12–19 years and had no known chronic medical or mental health conditions. Hacettepe University Ethics Committee approved the research protocol. Informed consent was obtained from both the adolescents and their parents.

The average Ramadan fasting period was 17 hours and 7 minutes (ranging from 16 hours and 58 minutes to 17 hours and 13 minutes) in Ankara and Kütahya. Each participant was given a self-report questionnaire. Fasting adolescents were asked why they fast (faith, to lose weight, thinks it is healthy, to comply with the social environment, family or social pressure), how many years they have been fasting in Ramadans, how their weight had been affected in the past Ramadans, food preferences and the factors affecting their eating behaviors during sahur and iftar at home or at iftar parties. The nonfasting adolescents also answered the relevant questions. Participants were asked to mark all options applicable to them in the multi response questions.

Body mass index (BMI) values were calculated by dividing the body weight (kg) by the square of the height (m^2). Dietary intake of adolescents was assessed using a 24-hour dietary recall by the research dietician. The portion sizes were confirmed using a photographic food atlas. Dietary energy, macro- and micronutrient intakes were calculated by a special dietary analysis computer program (BeBIS ®-Nutrition Information System, Version 7.1).

Risk of disordered eating attitudes were evaluated with Eating Attitudes Test-26 (EAT-26) (Garner, Olmsted, Bohr, & Garfinkel, 1982) and Three Factor Eating Questionnaire-Revised 18 (TFEQ-R18) (de Lauzon et al., 2004), whereas body image perceptions were rated by using The Stunkard's Figure Rating Scale (FRS) (M. A. Thompson & Gray, 1995).

EAT-26 is a valid, sensitive and specific measure for detecting individuals at high risk for eating disorders (Dotti & Lazzari, 1998; Garner et al., 1982), but further clinical evaluation is necessary to make a correct diagnosis (Williams, Hand, & Tarnopolsky, 1982). EAT-26 consists of three subscales, bulimia, dieting and oral control. The total score ranges from 0 to 78 and the score ≥ 20 is accepted as a cut-off point (Garner et al., 1982). For the subscores, cut-off values are 18, 4 and 5 for dieting, bulimia and oral control, respectively. The Turkish version of the EAT, developed by Savasir and Erol (1989) was used.

TFEQ-R18 assesses the current dietary habits and measures three different aspects of eating behavior (de Lauzon et al., 2004): cognitive restraint, uncontrolled eating, and emotional eating. The scores of cognitive restraint, uncontrolled eating and emotional eating are collected separately and the raw scores are converted to a score of 0–100. Higher scores are more indicative of

cognitive eating, uncontrolled eating, or emotional eating. de Lauzon et al. (2004) showed that the scale was valid in adolescents and young adults and validation of the Turkish version of the scale was done by Kıraç et al. (2015).

FRS is a visual sequential measure of 9 schematic body silhouettes (M. A. Thompson & Gray, 1995) Card 1 shows a very thin human silhouette while card 9 shows a very obese human silhouette. Individuals are asked to choose the card of the silhouette which they believe reflects 1) their body image (I); 2) a healthy body image (HEALTHY); and 3) their ideal body image which they would like to have (IDEAL). The difference between the figures which they believe is healthy and is the closest to themselves (HEALTHY – I) (more objective), and the difference between the figures which they believe is ideal and the closest to themselves (IDEAL – I) (more subjective) show body image dissatisfaction (BID) and the scores vary between −8 and +8. The greater the difference is, the greater the body image dissatisfaction rate (Gardner, Stark, Jackson, & Friedman, 1999). It is widely used as a valid scale in quantitative studies concerning body perception for both genders (Gardner, Friedman, & Jackson, 1998).

Statistics

The statistical analyses were performed using IBM® SPSS® Statistics version 23. Descriptive statistics were used for the questions related to Ramadan fasting. The independent sample t-test was used for BMI, energy and macronutrient intake and TFEQ-R18 scores in both groups. The differences between groups were compared with Pearson chi-square test. Spearman's rank correlation test was used to determine correlations between EAT-26 and TFEQ-R18 scales in fasting adolescents during Ramadan. The relationships of EAT-26 and TFEQ-R18 scales' scores were determined with independent sample t-test or Mann Whitney- U test. The statistical significance level was accepted as $p \leq 0.05$.

Results

A total of 287 adolescents participated. The age, sex, mean BMI, mean energy and macronutrient intake of participants are presented in Table 1. There was no statistically significant difference between energy and macronutrient intakes in fasting and non-fasting groups during Ramadan (Table 1).

The number of adolescents whose EAT-26 scores were above the cut-off range and at risk of disordered eating and the mean TFEQ-R18 scores of fasting and nonfasting adolescents during Ramadan are presented in Table 1. A statistically significant difference was detected in the emotional eating subscore of TFEQ-R18 between the fasting and non-fasting groups but

Table 1. The age, sex, BMI, energy and macronutrient intake of participants, the number of adolescents with EAT-26 scores in psychopathological range and the mean TFEQ-R18 scores in fasting and non-fasting groups, FRS body image dissatisfaction among fasting and non–fasting adolescents.

		Fasting	Non-fasting	p
N (%)	Total	238	49	-
	Girls	142 (59.7%)	33 (67.3%)	0.31
	Boys	96 (40.3%)	16 (32.7%)	
Age (mean±sd)		15.69(± 0.10)	14.79 (± 0.2)	**0.001***
BMI(mean±sd)		21.29 (±0.25)	22.00 (±0. 7)	0.36
Energy intake (kcal/day) (mean±sd)		1453.49 (±46.44)	1573.76 (±98.00)	0.21
Percent of energy from(mean ±sd)	lipid	39.02 (±0.75)	40.92 (±1.3)	0.20
	protein	14.30 (±0.58)	15.52(±0.65)	0.25
	carbohydrate	44.87 (+0.79)	41.79(±1.59)	0.06
EAT-26	Total ≥20	41 (%17.2)	9 (%18.4)	0.49
(≥ cut of	Dieting ≥18	16 (%6.7)	3 (%6.1)	0.59
score)	Bulimia ≥ 4	27 (%11.3)	5 (%10.2)	0.82
N (%)	Oral control ≥ 5	93 (%39.1)	16 (%32.7)	0.39
TFEQ-R18 (mean±sd)	Total	63.25(±1.33)	67.13 (±2.34)	0.16
	Cognitive restrain	53.30(±2.10)	61.13(±3.76)	0.07
	Uncontrolled eating	47.05(±2.41)	54.14(±4.48)	0.17
	Emotional eating	56.90(±1.20)	67.27(±3.30)	**0.009***
FRS BID	satisfied with the body	54(22.8%)	3(6.1%)	**0.025***
(HEALTHY- I)	want to lose weight	83(35%)	16 (32.7%)	
N (%)	want to lose weight and have BID	33(13.9%)	13 (26.5%)	
	want to gain weight	57(24.1%)	13 (26.5%)	
	want to gain weight and have BID	10(4.2%)	4(8.2%)	
FRS BID	satisfied with the body	54(22,8%)	5(10.2%)	0.19
(IDEAL-I)	want to lose weight	84(35.4%)	17 (34.7%)	
N (%)	want to lose weight and have BID	42(17.7%)	13 (26.5%)	
	want to gain weight	47(19.8%)	10 (20.4%)	
	want to gain weight and have BID	10(4.2%)	4 (8.2%)	

***P < 0.05**

sd = standard deviation; BMI = Body mass index, **EAT-26** = Eating Attitudes Test-26; **TFEQ-R18 =** Three Factor Eating Questionnaire-Revised 18; **FRS =** The Stunkard's Figure Rating Scale; **BID =** Body Image Dissatisfaction; **HEALTHY – I**: the difference between the FRS silhouettes which participants think it is healthy and the closest to themselves; **IDEAL – I**: the difference between the FRS silhouettes which participants think it is ideal and the closest to themselves

there was no difference between total scores, cognitive restraint and uncontrolled eating subscores (Table 1).

FRS HEALTHY- I BID and IDEAL-I BID scores were grouped into 5 subgroups; "Satisfied with the body", "want to lose weight", "want to lose weight and have BID", "want to gain weight", and "want to gain weight and have BID" in both fasting and non-fasting groups (Table 1). The results show that HEALTHY-I BID is significantly higher amongst non-fasting adolescents whereas IDEAL-I BID did not differ significantly between the groups (p = .025).

The correlations between the TFEQ-R18 and EAT-26 scores were examined in the fasting group. The TFEQ-R18 total scores were significantly correlated with EAT-26 total, dieting and bulimia scores. Cognitive restraint scores were significantly correlated with total and dieting scores. Uncontrolled eating scores were significantly correlated with dieting and bulimia scores whereas emotional eating scores were not correlated with any of the EAT-26 scores (Table 2).

The fasting adolescents were grouped according to pathological cut-off points of EAT-26 scores and the relationships between these groups were examined according to their TFEQ-R18 total, cognitive restraint, emotional eating and uncontrolled eating scores (Table 3).

TFEQ-R18 emotional eating scores were significantly higher in the fasting adolescents having bulimia scores at the pathological levels whereas TFEQ-R18 uncontrolled eating scores did not show any significant relationship with dieting scores between the sub-groups of fasting adolescents during Ramadan.

The adolescents reported their reasons for fasting during Ramadan were as follows (multiple reasons could be reported if applicable); due to their "faith" (n = 232, 97.5%), they believe it to be healthy (n = 39, 16.4%), to comply with the social environment (n = 5, 2.1%), for losing weight (n = 8, 3.4%) and due to family or social pressure (n = 19, 8%). When the EAT-26 scores were evaluated according to the reasons for fasting, total scores were in the pathological range in 39 (16.8%) of adolescents who fasted due to their faith.

When the adolescents were asked how their weights were affected from fasting in the past Ramadans, 53 reported weight loss and 32 reported weight gain, whereas 157 adolescents were not aware of any change. Cognitive restraint scores of adolescents who reported that they lost weight were statistically significantly higher than the ones who reported that they gained

Table 2. Correlations between EAT-26 and TFEQ-R18 scales of fasting adolescents.

			EAT- 26 (N = 238)	
TFEQ-R18	Total	Dieting	Bulimia	Oral control
Total				
P	**0.03***	**0.001***	**0.011***	0.54
Cognitive restrain				
P	**0.005***	**0.000***	0.19	0.70
Emotional eating				
P	0.19	0. 06	0.07	0.91
Uncontrolled eating				
P	0.17	**0.03***	**0.011***	0.54

***P < 0.05**

EAT-26 = Eating Attitudes Test-26; **TFEQ-R18 =** Three Factor Eating Questionnaire-Revised 18

Table 3. The relationships between EAT-26 and TFEQ-R18 scales when the fasting adolescents grouped according to EAT-26 pathological cut-off points.

	EAT-26							
	Total		Dieting		Bulimia		Oral control	
TFEQ-R18	<20	≥20	<18	≥18	<4	≥4	<5	≥5
	N = 197	N = 41	N = 222	N = 16	N = 211	N = 27	N = 145	N = 93
Total score mean (sd)	61.52 (19.8)	71.56 (22.1)	61.99 (20.0)	80.75 (19.7)	61.40 (19.6)	77.70 (22)	63.65 (20.6)	62.64 (20.5)
P	**0.009***		**0.002***		**0.001***		0.71	
Cognitive restrain mean(sd)	50.52 (31.2)	66.67 (34.8)	51.32 (31.8)	80.81 (28.8)	51.85 (32.4)	64.70 (30.4)	53.28 (32.4)	53.34 (32.5)
P	**0.008***		**0.001***		**0.04***		0.9	
Emotional eating mean(sd)	55.65 (30.7)	62.89 (33.3)	55.93 (30.5)	70.28 (33.0)	54.91 (29.6)	72.44 (35.9)	56.51 (30.9)	57.50 (30.9)
P	0.20		0.11		**0.02***		0.81	
Uncontrolled eating mean(sd)	45.01 (35.8)	56.89 (42.6)	45.47 (36.2)	68.99 (45)	44.18 (35.4)	69.56 (43.6)	48.05 (38.8)	45.50 (34.9)
P	0.10		0.06		**0.007***		0.59	

* $p < 0.05$

EAT-26 = Eating Attitudes Test-26; **TFEQ-R18 =** Three Factor Eating Questionnaire-Revised 18;
sd = standard deviation

weight or that they were not aware of any change (p = .024), whereas there was no statistically significant difference in TFEQ-R18 scores.

Twenty-four adolescents reported that they tried to eat less although they were hungry at the iftar meals at home, and cognitive restraint scores for them were found to be statistically significantly higher (p = .043). When the adolescents were asked about their eating attitudes at the iftar parties, 78 adolescents reported that they ended eating when they stopped feeling hungry and their cognitive restraint scores were also significantly higher (p = .037).

Only 17 fasting adolescents reported that they were not hungry at sahur since they had eaten too much at the iftar meal. These adolescents' TFEQ-R18 total (p = .016), cognitive restraint (p = .039) and uncontrolled eating (p = .034) scores were statistically significantly higher than the ones reporting hunger at sahur.

Discussion

Recently an increasing number of adolescents with disordered eating patterns have sought care at the Adolescent Medicine Clinic at Hacettepe University during or shortly after Ramadan. In 2014, we published a case series of six of these patients; three of which were diagnosed with an ED and three that did not meet full criteria (Akgül, Derman, & Kanbur, 2014). A common factor seen in four of these cases was that they had felt they could succeed in continuing dieting after they fasted during Ramadan as a religious duty (Akgül et al., 2014).

This clinical observation led us to ask the question what is the motive for adolescents to fast in Ramadan and whether Ramadan fasting correlates with any disordered eating behaviors or if it is a risk factor for disordered eating in adolescents. Thus, with this study we aimed to examine the relationship between Ramadan fasting and eating behaviours. We also evaluated the body image perceptions and the motivational factors related to the eating behaviours in fasting adolescents after prolonged hunger during Ramadan.

There have been various studies about the effects of Ramadan fasting on weight (Hajek, Myers, Dhanji, West, & McRobbie, 2012) but to our knowledge, the relationship between Ramadan fasting and BID as well as disordered eating behaviours has not been studied. The novel aspect of evaluating disordered eating patterns in this group of adolescents is that it would be inappropriate to consider eating after Ramadan fasting equivalent to eating after non-spiritual fasting (skipping meals) in the same context, as the motivation is different. Individuals who fast during Ramadan generally consume a large meal after hunger which is not the case for those skipping meals for dieting purposes.

In our study, the daily energy intake was similar in both fasting and nonfasting groups but was below the recommended daily intake according to their age and gender. This can be explained by the decrease in the number of meals and prolonged hunger periods due to the summer season in fasting adolescents. The reason for the low energy intake of nonfasting adolescents may be that the family members of these adolescents are fasting even if they are not, which inturn may mean the number of meals has decreased in line with the meal times of their families. Another factor would be the method we used for the nutrition history. It is ideal to take a 3-day or 1-week food diary but we used a 24-hour recall method in this study to prevent data loss but underreporting is a limitation of this method. It is important that we did not find any significant difference between energy and macronutrient intake in fasting and non-fasting groups with the same method which is consistent with the above comment that larger meals are consumed at iftar meals which could be considered as nutritional catch up.

In the literature, there is only one study, also from Turkey, that has evaluated the effects of Ramadan fasting on appetite and eating behaviors in adolescents (Erol, Baylan, & Yazici, 2008). This is important when we compare Ramadan fasting as a culture-based contributor as well as a religious factor that may affect the eating behaviours. Constitutionally, Turkey is a secular country but yet the majority of the population in Turkey is Muslim. Fasting is a common practice but there are certain cultural differences between fasting during Ramadan in Turkey when compared to other Islamic countries. There are no penalties for eating in public during Ramadan daytime in Turkey which may not be the case for some other countries where eating in public during fasting hours is discouraged. In some societies, the motive for fasting may be because of potential stigma and passing of judgement if not fasting. Of course, there are some differences concerning stigmatization of eating in public between different cities in Turkey. This is why we included two different cities in the study. All restaurants are open and the atmosphere during daylight hours is similar to that of nonfasting times in Ankara, whereas we thought there may be some social pressure to fast in Kütahya, a small city in middle Anatolia.

In their study, Erol et al. (2008) evaluated whether Ramadan fasting changes the eating behaviours of young people. Their study group consisted of healthy female and male adolescents who fasted during the Ramadan month. There was no nonfasting control group. No statistically significant differences were found between the scores of EAT and Bulimic Investigatory Test, Edinburgh (BITE) which were administered within the weeks before and after Ramadan. They concluded that Ramadan fasting restrictions do not seem to have an impact on eating behaviours of young girls and boys (Erol et al., 2008). In our study, we included both fasting adolescents and

nonfasting adolescents as the control group. Additionally, we also investigated the body image dissatisfaction in relation to eating behaviours.

In our study, there was no difference between EAT-26 and TFEQ-R18 scores between the fasting and non-fasting groups, except the emotional eating subscores of TFEQ-R18. This result suggests that there is no relationship between Ramadan fasting and eating behaviours of adolescents. However, lower emotional eating subscores in fasting adolescents suggest that these adolescents control their eating during Ramadan with their spiritual decisions which are indeed defined with religious rules.

FRS IDEAL-I as the subjective measure of BID did not differ significantly between fasting and non-fasting adolescents which suggests BID does not affect the decision to fast during Ramadan. This result was consistent with the outcome that only 3.4% of adolescents stated they fast during Ramadan to lose weight. HEALTHY- I BID as the objective measure of BID was found to be significantly higher amongst non-fasting adolescents which was also consistent with our data that only 16.4% of adolescents reported they fast because they believe it is healthy and 97.5% of adolescents stated they fast for religious purposes.

Significant correlations between TFEQ-R18 and EAT-26 scales indicate the scores we obtained from these questionnaires were valid and reliable. However, before grouping the fasting adolescents according to pathological cut-offs, we did not find any correlation between emotional eating scores of TFEQ-R18 and bulimia scores of EAT-26 which are supposed to be the corresponding areas in two different scales and in contrast, we found correlation between uncontrolled eating and dieting which are not the corresponding areas. Then, as expected emotional eating scores were significantly higher in the fasting adolescents having bulimia scores at a pathological level whereas the correlation between uncontrolled eating and dieting scores disappeared.

The effect of Ramadan fasting on weight changes is controversial in the literature. Both weight loss (Hallak & Nomani, 1988; Ziaee et al., 2006) and increase in energy intake and average body weight immediately after Ramadan have been reported (Frost & Pirani, 1987). In our study, some of the fasting adolescents reported weight loss whereas some reported weight gain in past Ramadans but the majority of them were not aware of the weight changes which suggests that they did not have any concerns about their weight in relation to their fasting and/or their decision in choosing to fast or not, rather than fasting itself.

Only 10% of adolescents reported that they tried to eat less although they were hungry at the iftar meals at home and only one third of adolescents reported that they stopped eating as soon as they stopped feeling hungry at iftar parties, whereas the others enjoyed having various foods to taste. These findings also imply the socio-cultural practices and different motivational

factors in different social settings like iftar parties, as well as hunger, affect the amount of food consumed.

We are well aware that our study does not enable us to examine the causal relationships of the effects of Ramadan fasting on eating behaviours but helps us to determine the cross-sectional relationship between them. Thus, this study could be considered as a starting point to design an experimental or longitudinal study to examine whether there is a causal relationship between Ramadan fasting and disordered eating/eating disorders.

In conclusion, this study suggests that motivation to fast was due to spiritual decisions rather than for weight control or other emotional factors in adolescents during Ramadan in Turkey. Ramadan fasting was not associated with a decrease in daily caloric intake nor was it correlated with disordered eating behaviors or body image dissatisfaction. Further studies are needed to evaluate the relationship between Ramadan fasting and disordered eating behaviours in different countries and multi-country studies would be even better for risk evaluation.

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Conflict of interest

The authors have no conflict(s) of interest to declare.

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