



Effect of emotional eating and social media on nutritional behavior and obesity in university students who were receiving distance education due to the COVID-19 pandemic

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Abstract

Aim This study aimed to evaluate the effects of emotional eating and social media on nutritional behavior and obesity in university students receiving distance education during the pandemic.

Subject and methods This cross-sectional study was performed with 1000 undergraduate students who were receiving distance education due to COVID-19 in Türkiye. Data were collected using an online questionnaire that included demographic information, height, body weight, eating habits, the Scale of Effects of Social Media on Eating Behavior (SESMEB), and the Emotional Eating Scale (EES). A *p* value less than 0.05 was considered as statistically significant for statistical tests.

Results During the distance education period, more than half of both male and female students (61.7%; 58.2%) changed their meal pattern, 31.7% of them started to consume their main meals more regularly, and 31.2% of them began to skip their main meals. Of the participants, 52.6% spent more than 2 hours a day on social media. The female students who spend more than 2 hours a day on social media have higher SESMEB and EES scores than those who spend 2 hours or less a day (*p* < 0.01). The score SESMEB is positively weakly correlated with body mass index (BMI) (ρ 0.132, *p* < 0.01) and positively moderately associated with the EES score (ρ 0.334, *p* < 0.01). The interaction between the SESMEB and EES scores increases the risk of overweight/obesity (odds ratio (OR) 1.002, *p* = 0.009).

Conclusion For the students who received distance education, social media affects eating behavior, BMI, and emotional eating. Additionally, these effects may increase the risk of overweight/obesity.

Keywords COVID-19 · Distance education · University students · Social media · Emotional eating

Introduction

Coronavirus disease 2019 (COVID-19), which first appeared in Wuhan, China, in December 2019, was declared a pandemic by the World Health Organization (WHO) due to its simultaneous spread worldwide and threat to the health of a large number of people (World Health Organization 2021). The pandemic caused by COVID-19 has resulted in a rapid change in social life, working systems, and nutritional habits and directly affects the physical and mental health of people. The importance of reducing the transmission rate of the virus in fighting the disease is frequently emphasized. It is known that social isolation and quarantine are protective methods to minimize the risk of contaminating other people (Hwang et al. 2020). Countries are taking strict measures, such as travel bans and lockdowns, to prevent the spread of the virus (Güner et al. 2020).

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Due to the global pandemic of COVID-19, one of the measures taken in Türkiye by the Council of Higher Education, from the date 16.03.2020, was to begin using distance education at universities. With these measures taken, quarantine can lead to adapting a sedentary lifestyle, which changes an individual's educational period, social life, and social participation (Clair et al. 2021). Studies have also suggested that, during the pandemic, the physical activity level of young adults and university students decreased, and their anxiety levels increased (Antunes et al. 2020; Gallo et al. 2020). In changing living conditions, individuals tend to develop unhealthy eating habits (such as emotional eating, eating disorders) and experience negative emotions (stress, boredom, etc.) (Moynihan et al. 2015; Araiza and Lobel 2018). Moreover, frequent sharing of information about the health impact of the pandemic on television, other media, and social media can cause an increase in psychological stress and anxiety. People tend to overeat as a way to reduce these kinds of moods (Choi 2020). In a study conducted with university students, the majority of students (71.6%) identified boredom as a reason for eating. However, it was determined that students tend to consume foods with high energy and fat content during emotional eating (Alalwan et al. 2019). On the other hand, negative experiences and physiological stress reactions associated with satiety may cause eating restriction (Di Renzo et al. 2020). In a study by Cheng and Kamil (2020), it was shown that university students received lower energy in cases of stress, and this situation could negatively affect their health (Cheng and Kamil 2020).

Adequate and balanced nutrition is essential in the prevention and treatment of infectious diseases. Therefore, maintaining a healthy diet during the COVID-19 pandemic is especially important and necessary to support the immune system (Di Renzo et al. 2020). Many environmental factors affect the eating habits of individuals. One of these is the use of the internet and social media, which has become an indispensable part of daily life as a result of developments in information and communication technology. Social media is defined as any web-based communication channel and online social network dedicated to community-based interaction, content sharing, and/or collaboration. With technological convergence (accessing several technologies from one device), many young adults can access social media on their mobile phones and prefer to have access to their social networks at all times (Brown and Bobkowski 2011). It is thought that students' use of the internet and social media has increased due to quarantine and distance education, especially during the COVID-19 pandemic. According to the Digital 2020 report published by a digital marketing agency, more than 4.5 billion people were using the internet at the beginning of 2020, while more than 3.8 billion people were actively using social media. According to the same report,

89% of internet users across the world use social media applications, and adults spend an average of 2 hours 51 minutes a day on social media in Türkiye (Global Digital Overview 2020). Another study determined that 89.4% of young adults regularly used at least one social media network in 2014, and the rate of social media usage among young adults increased to 97.5% in 2016 (Villanti et al. 2017). In a recent study by Masoud et al. (2019), it was determined that 94.2% of university students used at least one social network, and more than half of these students (55.6%) spent about 1–4 hours a day on social media (Masoud et al. 2019). These extended times spent on social media can easily lead users on specific issues, and significantly affect the food preferences of individuals (Hoogstins 2017). This study was planned and conducted to evaluate emotional eating status, the effect of social media on nutritional behavior, and obesity in university students who engaged in distance education due to the COVID-19 pandemic.

Methods

Research plan and sample

Emotional eating behavior and the effect of social media on the eating habits of university students between the ages of 18–27 who received distance education due to the COVID-19 pandemic were evaluated using an online questionnaire (Google forms). The study sample consisted of university students who engaged in distance education on lockdown during September–November 2020, who voluntarily agree to participate in the study, and who could be reached via the internet. Before participating in the online questionnaire, participants were required to give informed consent for participation and collection and analysis of their data by ticking the “Yes, I agree and hereby give my informed consent” box on the online form. The sample size was calculated using the G-Power program with an effect size of f^2 : 0.02 and a power of 95% at a significance level of 0.05; accordingly, it is aimed to reach 436 university students. During the study, 1110 students filled out the questionnaire, but the answers of 1000 students could be evaluated. Students who did not have internet access, did not use any social media tools, and who were studying for an associate degree program/master's degree/doctorate were excluded from the study. The questionnaire prepared by the researchers included demographic information, height and body weight, eating habits, SES-MEB, and the EES. The BMI of the individuals was calculated with the height and body weight data obtained based on the statement. According to World Health Organization classification, BMI was evaluated according $<18.5 \text{ kg/m}^2$ as underweight, $18.5\text{--}24.9 \text{ kg/m}^2$ as normal, $25.0\text{--}29.9 \text{ kg/m}^2$ as overweight $\geq 30.0 \text{ kg/m}^2$ as obesity (World Health

Organization 2022). According to the time they spend on social media, those who use social media for 2 hours or less per day were classified as moderate users, and those who use more than 2 hours as heavy users (Sampasa-Kanyinga et al. 2020).

The scale of effects of social media on eating behavior

The scale with a Cronbach's alpha value of 0.928, developed by Keser et al. (2020), measures the effect of social media on the eating behaviors of university students. The scale consists of 18 items and is a five-point Likert type (always – 5 points, often – 4 points, sometimes – 3 points, rarely – 2 points, and never – 1 point). There is no reverse-coded item. In this way, individuals get a minimum of 18 and a maximum of 90 points in total. A higher scale score is associated with a greater effect of social media on the individuals' eating behaviors (Keser et al. 2020).

The emotional eating scale

The EES, which was tested for validity and reliability in Turkish by Dogan (2011), is a scale used in determining the emotional eating (Dogan et al. 2011). The EES is a five-point Likert type scale and is scored as 1 – not convenient at all, 2 – not convenient, 3 – somewhat convenient, 4 – convenient, and 5 – completely convenient. A higher total score on the scale indicates the emotional eating behavior level of the individual (Dogan et al. 2011).

Statistical analysis

When the data were provided with parametric assumptions, the comparison of two independent groups in terms of a numerical variable was made by Student's t-test. The chi-squared test was used to compare categorical variables. The relationship between two numerical variables was evaluated using Spearman correlation analysis since parametric assumptions were not provided. Multinomial logistic regression analysis was used to determine the variables affecting BMI and its risk ratios. The statistical significance level was accepted as $p < 0.05$. The data were analyzed using the IBM SPSS Statistics package program for Windows.

Results

This study was conducted to determine the emotional eating status, the effect of social media on eating behavior, and obesity of students entering the distance education period due to the COVID-19 pandemic. The total number of students participating in the study was 1000, 20.8% male ($n =$

208) and 79.2% female ($n = 792$). Most students (65.2%) were in the Faculty of Health Sciences, 13.6% in Faculty of Engineering and Architecture, 12.5% in Faculty of Management, and 8.7% in Faculty of Education. The majority of the students (62.2%) stated that they had two main meals a day, 37.3% of the students had two snacks a day, and 29.1% of them had one snack a day (respectively $\chi^2 = 19.899$; 18.026, $p < 0.001$). After entering the distance education period, it was seen that more than half of both male and female students (61.7%; 58.2%) changed their meal pattern, as 31.7% of students started to consume their main meals more regularly, and 31.2% of them began to skip their main meals. Of the female students, 14.0% stated that prepackaged biscuits, chips, and junk food consumption increased and 33.5% of them stated that pastry/cake/muffin consumption increased, while 30.3% of the male students stated that they started to eat healthier. However, it was determined that 45.1% of the students did not exercise regularly during their stay at home (Table 1).

The average BMI of the female students included in the study was 21.66 ± 3.27 kg/m², while the male students were 24.05 ± 3.21 kg/m²; the average BMI of the males was higher than that of the female students ($t = 9.377$, $p < 0.01$). While 12.1% of the female students were overweight and 2.0% had obesity, 30.3% of the males were overweight and 3.8% of them had obesity; the rates of overweight and obesity were higher in males than females ($\chi^2: 52.898$, $p < 0.01$). Of the students, 37.6% of females and 39.9% of males stated that they gained weight while engaged in the distance education period (Table 2).

All of the students participating in the study stated that they used social media. It was determined that 54.0% of female students and 47.1% of male students spent more than 2 hours a day on social media ($p = 0.086$). Of the female students, 42.2% used social media to spend time/share, while 42.3% of males followed the news ($\chi^2 = 34.045$, $p < 0.01$). It was observed that 81.1% of the students were interested in nutrition news on social media; 31.2% of females and 36.5% of males were interested in nutrition news on social media and followed up-to-date information. However, 32.9% of the students thought that the nutrition news on social media was not reported correctly; 78.1% of the students stated that posts about nutrition written by a dietician were more reliable (Table 3).

The relationship between the daily social media usage time of the students on the SESMEB score and the EES score are given in Table 4. It was determined that female students who spent more than 2 hours a day on social media had higher scores on SESMEB and the EES compared to those who spent 2 hours or less a day ($p < 0.01$) (Table 4).

It was seen that the SESMEB score of students was positively weakly correlated with BMI ($\rho = 0.132$, $p < 0.01$) and positively moderately associated with the EES score

Table 1 The students' eating habits and exercise status

	Female (<i>n</i> = 792) % (<i>n</i>) % (<i>n</i>)	Male (<i>n</i> = 208) % (<i>n</i>) % (<i>n</i>)	Total (<i>n</i> = 1000) % (<i>n</i>) % (<i>n</i>)	χ^2	<i>p</i>
Frequency of main meals/day					
1	2.2 (17)	6.7 (14)	3.1 (31)	19.899	<0.001*
2	65.0 (515)	51.5 (107)	62.2 (622)		
3	32.8 (260)	41.8 (87)	34.7 (347)		
Frequency of snacks/day					
0	9.5 (75)	15.9 (33)	10.8 (108)	18.026	0.001*
1	27.3 (216)	36.1 (75)	29.1 (291)		
2	38.9 (308)	31.2 (65)	37.3 (373)		
3	17.3 (137)	10.6 (22)	15.9 (159)		
4	7.0 (56)	6.2 (13)	6.9 (69)		
Has there been any change in the meal order during the distance education?					
Yes	61.8 (489)	58.2 (121)	61.0 (610)	7.115	0.029*
No	14.6 (116)	22.1 (46)	16.2 (162)		
Partially	23.6 (187)	19.7 (41)	22.8 (228)		
Changed situation [‡]					
I started to consume regular main meals	29.6 (200)	40.7 (66)	31.7 (266)	–	–
I started to consume regular snacks	15.2 (103)	13.0 (21)	14.8 (124)		
I started skipping my main meals	31.5 (213)	29.6 (48)	31.2 (261)		
I started skipping my snacks	15.2 (103)	14.2 (23)	15.0 (126)		
I started eating more often, and quantity	8.5 (57)	2.5 (4)	7.3 (61)		
Information about eating habits after entering the distance education					
I think I am eating healthier	20.2 (160)	30.3 (63)	22.3 (223)	31.411	<i>p</i> < 0.01*
My fruit and vegetable consumption has increased to support my immune system	20.9 (166)	16.8 (35)	20.1 (201)		
My consumption of prepackaged biscuits, chips, and junk food has increased	14.0 (111)	13.5 (28)	13.9 (139)		
I started eating pastry/cake/muffin all the time	33.5 (265)	18.7 (39)	30.4 (304)		
My eating habits/patterns have not changed	11.4 (90)	20.7 (43)	13.3 (133)		
Exercising regularly while staying at home					
is doing	16.7 (132)	29.8 (62)	19.4 (194)	21.327	<i>p</i> < 0.01*
not doing	45.4 (360)	44.2 (92)	45.2 (452)		
sometimes he/she does	37.9 (300)	26.0 (54)	35.4 (354)		

[‡]Individuals who answered yes or sometimes replied. Pearson chi-square test “–” test not performed. **p* < 0.05

($\rho = 0.334$, $p < 0.01$) (Table 5). As the effect of social media on eating behavior increased, emotional eating and BMI increased in students.

Within the scope of the study, when the variables affecting the BMI of the students were modeled by determining them from all variables by the backward elimination method; age, gender, number of main meals, reasons for following nutrition issues on social media, and SESMEB and EES score were significant. The model's accuracy was determined to be 70.7%. When the students with a normal body weight according to the BMI classification are taken as a reference, it was determined that older age and male gender increased the risk of overweight and obesity in

these students (OR 1.038, 4.439; $p = 0.517$, $p = 0.009$, respectively), and students who ate two main meals a day had an increased risk of overweight and obesity (OR 1.771; $p = 0.012$) compared to students who had three main meals. While the risk of being overweight and obese was higher in students who followed nutrition news on social media to control weight or lose weight, compared to normal weight individuals (OR = 2.438; $p = 0.005$), the risk of being thin compared to normal individuals was higher in students who followed learning to eat healthy (OR 2.350; $p = 0.019$). The interaction of SESMEB and EES scores significantly increased the risk of overweight and obesity (OR 1.002, $p = 0.009$) (Table 6).

Table 2 The pattern of students according to body mass index classification and weight changes

	Female (<i>n</i> = 792) M±SD	Male (<i>n</i> = 208) M±SD	Total (<i>n</i> = 1000) M±SD	<i>t</i>	<i>p</i>
BMI (kg/m ²)	21.66±3.27	24.05±3.21	22.16±3.40	9.377	<0.01 ^{*a}
BMI classification	% (<i>n</i>)	% (<i>n</i>)	% (<i>n</i>)	χ ²	<i>p</i>
Underweight	13.9 (110)	3.8 (8)	11.8 (118)	52.898	<0.01 ^{*b}
Normal	72.0 (570)	62.1 (129)	69.9 (699)		
Overweight	12.1 (96)	30.3 (63)	15.9 (159)		
Obesity	2.0 (16)	3.8 (8)	2.4 (24)		
Change in body weight during distance education					
My body weight increased	37.6 (298)	39.9 (83)	38.1 (381)	3.298	0.348 ^b
My body weight decreased	14.2 (112)	11.0 (23)	13.5 (135)		
Not changed	26.1 (207)	30.3 (63)	27.0 (270)		
I don't know, I'm not sure	22.1 (175)	18.8 (39)	21.4 (214)		

^aIndependent samples *t* test; ^bPearson chi-square test; ^{*}*p* < 0.05

Discussion

The pandemic caused by the COVID-19 virus threatens the physical and mental health of people globally. However, the measures taken against the pandemic have caused changes in social life, education systems, working systems, and nutritional behavior in a short time (Mattioli et al. 2020). This study was planned and conducted to determine the effect of changing living conditions on the emotional eating behavior of university students engaging in distance education during lockdown and to determine the effect of social media on eating behavior and obesity. In this study, most of the students (83.8%) stated that their meal patterns changed, 31.7% said that they consumed a more regular main meal, and 31.2% indicated that they started to skip their main meals. Additionally, 30.4% of the students stated that their consumption of pastry increased, 20.1% of them raised their consumption of fruits and vegetables, and 7.3% started to consume meals more often and in quantity (Table 1). In a study conducted on the nutritional behavior of adults in the quarantine period during the pandemic, it was determined that 33.7% of the individuals consumed their meals regularly during the quarantine, but their pastry consumption did not change. Vegetables were the most frequent food group eaten daily by 26.9% of participants (Błaszczuk-Bębenek et al. 2020). In another study, it was found that 6.8% of individuals started to eat more during the quarantine, and 21.2% of them increased their consumption of fresh fruit and vegetables (Scarmozzino and Visioli 2020). It has been stated that the COVID-19 pandemic and quarantine practices can affect nutritional behaviors in different ways in different societies; some individuals increased consumption of vegetables and fruits and some of them increased consumption of pastry. In addition, it is thought that some students started to consume their meals more regularly in the family due to distance education, and some of them could not adapt

due to the deterioration of the existing pattern in university life, and therefore their meal patterns were disrupted. The quarantine practice during the pandemic limited daily life activities, causing a decrease in physical activity level and making it challenging to access exercise areas. This situation is an important factor in body weight change (Ammar et al. 2020). This study found that 45.2% of the students did not exercise regularly while staying at home, and 54.8% did exercise at home, albeit only sometimes. A study conducted with university students determined that students spent more time sitting. However, the study's results showed that students spent their time doing more exercise (Romero-Blanco et al. 2020). In university students, the social environment and circle of friends may prevent acquiring exercise habits, as well as understanding the importance of exercise in the quarantine and increasing the time spent at home; it can be said that the performance of exercise at home increased.

In this study, 38.1% of the participants stated that they gained weight during quarantine (Table 2). A study conducted with adult individuals (Zachary et al. 2020) determined that 22% of the individuals gained weight during the pandemic; and in another study (Sidor and Rzymiski 2020) approximately 30% of the participants gained weight. Studies have reported that, during the COVID-19 pandemic, individuals showed increased weight gain due to increased anxiety and depression, and changes in physical activity and lifestyle factors facilitated weight gain (Pellegrini et al. 2020; He et al. 2021). During the pandemic, the transition of university students from a dynamic and active lifestyle to a more sedentary and stable lifestyle with distance education and the psychological and social effects of the pandemic are significant variables that cause weight gain.

With the increase in technology and internet use among young adults and university students, social media usage is also becoming widespread. In the digitalized world, due to the COVID-19 pandemic, almost all training and activities

Table 3 Information on students' use of social media

	Female (<i>n</i> = 792) % (<i>n</i>) % (<i>n</i>)	Male (<i>n</i> = 208) % (<i>n</i>) % (<i>n</i>)	Total (<i>n</i> = 1000) % (<i>n</i>) % (<i>n</i>)	χ^2	<i>p</i>
Time spent on social media (h/day)					
≤2 h/d moderate use	46.0 (364)	52.9 (110)	47.4 (474)	–	0.086 ^a
>2 h/d heavy use	54.0 (428)	47.1 (98)	52.6 (526)		
Purpose of using social media					
Play a game	3.7 (29)	8.7 (18)	4.7 (47)	34.045	<i>p</i> < 0.01 ^{*b}
To follow the agenda	33.8 (268)	42.3 (88)	35.6 (356)		
Follow your friends	3.2 (25)	2.4 (5)	3.0 (30)		
Spending time/sharing	42.2 (335)	28.8 (60)	39.5 (395)		
For a research	2.7 (21)	7.7 (16)	3.7 (37)		
Chat online	14.4 (114)	10.1 (21)	13.5 (135)		
Be interested in nutrition news on social media					
Yes	46.1 (365)	25.5 (53)	41.8 (418)	115.331	<i>p</i> < 0.01 ^{*b}
No	12.1 (96)	44.7 (93)	18.9 (189)		
Partially	41.8 (331)	29.8 (62)	39.3 (393)		
Reason to follow[‡]					
Learning to eat healthy	10.6 (74)	12.1 (14)	10.9 (88)	11.698	0.039 ^{*b}
To follow current information	31.2 (217)	36.5 (42)	31.9 (259)		
Learning to eat in diseases	3.9 (27)	7.0 (8)	4.3 (35)		
Weight control and weight loss	8.6 (60)	13.9 (16)	9.4 (76)		
Learning healthy recipes	12.4 (86)	7.0 (8)	11.6 (94)		
All	33.3 (232)	23.5 (27)	31.9 (259)		
The source he/she refers to in his/her nutritional problem					
Internet/social media	26.4 (209)	29.8 (62)	27.1 (271)	47.796	<i>p</i> < 0.01 ^{*b}
Dietitian	30.6 (242)	16.3 (34)	27.6 (276)		
Doctor	6.2 (49)	10.1 (21)	7.0 (70)		
Food engineer	28.8 (228)	30.3 (63)	29.1 (291)		
Another	8.0 (64)	13.5 (28)	9.2 (92)		
Does he/she pay attention to the sources of nutrition-related posts on social media?					
Yes	64.8 (513)	38.5 (80)	59.3 (593)	75.048	<i>p</i> < 0.01 ^{*b}
No	10.3 (82)	32.7 (68)	15.0 (150)		
Sometimes	24.9 (197)	28.8 (60)	25.7 (257)		
Does he/she think that the news about nutrition on social media is prepared correctly?					
Yes	2.3 (18)	5.8 (12)	3.0 (30)	40.195	<i>p</i> < 0.01 ^{*b}
No	28.8 (228)	48.5 (101)	32.9 (329)		
Sometimes	68.9 (546)	45.7 (95)	64.1 (641)		
The factor influential in the reliability of nutrition-related posts on social media					
Written by a nutritionist/dietician	81.1 (642)	66.8 (139)	78.1 (781)	40.412	<i>p</i> < 0.01 ^{*b}
Written by the doctor	9.1 (72)	18.8 (39)	11.1 (111)		
Written by someone who shares their experiences (losing weight, fighting disease, etc.)	7.9 (63)	10.6 (22)	8.5 (85)		
Another	1.9 (15)	3.8 (8)	2.3 (23)		

[‡]Individuals who answered yes or sometimes replied ^a Fischer exact test ^b Pearson chi-square test **p* < 0.05

are carried out online, as is the increase in the time people spend at home. It is thought that the use of the internet and social media has increased. In this study, all of the students used social media. It was determined that more than half of these students (52.6%) spent more than 2 hours a day

on social media (*p* = 0.086), 39.5% used social media to spend time and share, and 35.6% used it for staying up-to-date (*p* < 0.01). On the other hand, 81.1% of the students were interested in nutrition news on social media, and 31.9% stated that they followed nutrition news for healthy nutrition,

Table 4 The relationship between social media usage time and scale scores

Time spent on social media (h/ day)	Female (<i>n</i> = 792)		<i>t_s</i> / <i>p_s</i>	<i>t_e</i> / <i>p_e</i>	Male (<i>n</i> = 208)		<i>t_s</i> / <i>p_s</i>	<i>t_e</i> / <i>p_e</i>
	SESMEB score (M±SD)	EES score (M±SD)			SESMEB score (M±SD)	EES score (M±SD)		
Moderate use (≤2 h/d)	30.8±10.1	34.2±12.8	5.843/ <0.01	3.674/ <0.01	33.8±18.8	30.0±14.0	0.407/ 0.684	1.335/ 0.183
Heavy use (>2 h/d)	35.5±12.8	37.8±14.8			34.8±15.5	32.7±14.8		

Independent samples t-test. *t_s* *t* value for SESMEB, *p_s* *p* value for SESMEB. *t_e* *t* value for EES, *p_e* *p* value for EES

Table 5 The correlation between students' SESMEB score with EES score and BMI

	Female (<i>n</i> = 792)	Male (<i>n</i> = 208)	Total (<i>n</i> = 1000)
	rho	rho	rho
	<i>p</i>	<i>p</i>	<i>p</i>
BMI	0.165 <0.01*	0.137 0.048*	0.132 <0.01*
EES Score	0.315 <0.01*	0.387 <0.01*	0.334 <0.01*

Spearman correlation test. rho correlation coefficient. **p* < 0.01

weight control, and weight loss (Table 3). A study found that most students spent 1–4 hours/day on social media, mainly using social media to stay up-to-date (AlFaris et al. 2018). The widespread use of social media among university students suggests that social media has a strong influence on young adults. This effect of social media on students can affect all areas of their lives as well as their eating behavior. The study found that female students who spent more than 2 hours a day on social media had higher SESMEB and EES scores than those who spent 2 hours or less a day (*p* < 0.01) (Table 4). With the use of social media for more hours by female students, the effect of social media on eating behavior and emotional eating behavior increases. A study conducted with young adults and adolescents stated that social media use could cause unhealthy eating behaviors by affecting the physiopathological (stress, anxiety, depression, etc.) condition of individuals (Zeeni et al. 2018). Another study conducted with young American adults determined that individuals who develop nutritional anxiety spend more time on social media (Sidani et al. 2016). Spending more time on social media increases the level of exposure to social media and can affect eating behavior. This study determined that, as the effect of social media on eating behavior increased, BMI and emotional eating levels increased (*p* < 0.01) (Table 5). Another study showed that spending excessive time on social media significantly increased emotional eating behavior in students (Murray et al. 2016). With the increase of time spent on social media, the level of influence of students

from social media increases, and their exposure to news and posts about nutrition and food increases, thus increasing social media's effect on eating behavior. During distance education, news and posts related to the pandemic and the COVID-19 outbreak have increased on social media. It is thought that the increased exposure of the students to these posts can affect their levels of stress, depression, and anxiety, and may lead them to develop emotional eating behaviors.

Many factors affect the BMI value of university students, especially dietary habits, lifestyle, and physical activity levels. This study showed that male gender and older age in students increased the risk of overweight and obesity, and the frequency of main meals consumed daily also affected the risk (Table 6). According to data from the Türkiye National Nutrition and Health Survey (TNHS-2017), the prevalence of overweight and obesity in males between the ages of 19–30 (46.2%) is higher than in females (34.9%). Additionally, it has been observed that the prevalence of overweight and obesity increases as the age of individuals increases (Sağlık Bakanlığı Halk Sağlığı Genel Müdürlüğü [Republic of Türkiye Ministry of Health] 2019). The other studies support a higher prevalence of overweight and obesity in male students than females (Zamsad et al. 2019; Pital and Ghazali 2022). However, some studies stated that skipping meals is common among young adults, and the prevalence of overweight and obesity is high in young adults who skip meals (Aryee et al. 2013; Pendergast et al. 2016). This study showed that the interaction between SESMEB and the EES increases overweight and obesity (Table 6). It was seen that there is a relationship between social media use and students' eating behavior and emotional eating, as a result of which the risk of overweight and obesity may increase in students. It is thought that increased social media use, changing living conditions, and psychosocial factors during the pandemic may increase this risk.

Limitations

It can be said that the cross-sectional nature of the study prevents the establishment of causality. Since this study was

Table 6 Odds ratio (OR) values of variables that can affect the BMI

Variables	Normal weight	OR (%95 CI)	<i>p</i>
Age	Underweight	0.842 (0.728–0.975)	0.021*
	Overweight/obesity	1.038 (0.927–1.164)	0.517
Gender (male/female)	Underweight	0.242 (0.084–0.700)	0.009*
	Overweight/obesity	4.439 (2.718–7.248)	<0.001*
Number of mail means			
1 vs 3	Underweight	1.194 (0.287–4.974)	0.807
2 vs 3	Underweight	0.635 (0.399–1.011)	0.055
1 vs 3	Overweight/obesity	2.892 (0.782–10.702)	0.112
2 vs 3	Overweight/obesity	1.771 (1.134–2.767)	0.012*
Reasons to follow nutrition issues on social media			
1 vs 6	Underweight	2.350 (1.149–4.806)	0.019*
2 vs 6	Underweight	1.864 (1.063–3.269)	0.03*
3 vs 6	Underweight	0.695 (0.188–2.567)	0.585
4 vs 6	Underweight	0.621 (0.175–2.201)	0.46
5 vs 6	Underweight	1.144 (0.497–2.632)	0.753
1 vs 6	Overweight/obesity	0.880 (0.429–1.807)	0.728
2 vs 6	Overweight/obesity	0.757 (0.450–1.273)	0.294
3 vs 6	Overweight/obesity	1.114 (0.416–2.979)	0.83
4 vs 6	Overweight/obesity	2.438 (1.310–4.536)	0.005*
5 vs 6	Overweight/obesity	1.015 (0.519–1.986)	0.965
SESMEB total score	Underweight	1.014 (0.958–1.074)	0.629
	Overweight/obesity	0.941 (0.892–0.992)	0.025*
EES total score	Underweight	0.963 (0.904–1.026)	0.242
	Overweight/obesity	0.984 (0.944–1.026)	0.454
SESMEB*EES	Underweight	0.999 (0.998–1.001)	0.59
	Overweight/obesity	1.002 (1.000–1.003)	0.009*

Multinomial logistic regression analysis OR odds ratio. CI confidence interval. * $p < 0.05$. 1. Learning to eat healthy 2. To follow current information 3. Learning to nutrition in diseases 4. Weight control and weight loss 5. Learning healthy recipes 6. All

conducted online due to COVID-19 conditions, the body weights and heights of the participants were taken according to the self-report. Study findings are based on self-report data, which carries the risk of source bias.

Conclusion

The results showed that, in university students, the time spent on social media was greater during the distance education period, and social media affected eating behavior, body mass index, and emotional eating behavior. These conditions can affect the risk of developing obesity. It is thought that there may be a relationship between social media use and lifestyle, eating habits due to the widespread use of the internet and social media. For this reason, social media can be used as a tool in nutritional interventions and in conveying the right nutrition information to university students. For this, dietitians can organize various educational activities

through social media, and by raising awareness, young adults can be directed to healthy food choices.

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Author contributions All authors contributed to the study conception and design. All authors read and approved the final manuscript. SED: study design, data collection, statistics, results interpretation, writing the manuscript. AK: study design, results interpretation, reviewing the manuscript. ET: study design, data collection, results interpretation, writing the manuscript.

Data availability The data that support the findings of this study are available from the corresponding author upon request.

Code availability Not applicable.

Declarations

Ethical approval The study was conducted in accordance with the Declaration of Helsinki. Ethics committee approval was received for this

study from Kırıkkale University Non-Interventional Research Ethics Committee (Decision No: 2020.08.15).

Consent to participate All participants provided consent to participate by starting the survey. The study received a waiver of consent documentation.

Consent for publication Not applicable.

Conflict of interest The authors declare that they have no conflicting or competing interests.

References

- Alalwan TA, Hilal SJ, Mahdi AM et al (2019) Emotional eating behavior among University of Bahrain students: a cross-sectional study. *Arab J Basic Appl Sci* 26:424–432. <https://doi.org/10.1080/25765299.2019.1655836>
- AlFaris E, Irfan F, Ponnampertuma G et al (2018) The pattern of social media use and its association with academic performance among medical students. *Med Teach* 40:S77–S82. <https://doi.org/10.1080/0142159X.2018.1465536>
- Ammar A, Brach M, Trabelsi K et al (2020) Effects of COVID-19 home confinement on eating behaviour and physical activity: results of the ECLB-COVID19 international online survey. *Nutrients* 12:1583–1596. <https://doi.org/10.3390/nu12061583>
- Antunes R, Frontini R, Amaro N et al (2020) Exploring lifestyle habits, physical activity, anxiety and basic psychological needs in a sample of Portuguese adults during COVID-19. *Int J Environ Res Public Health* 17:1–13. <https://doi.org/10.3390/ijerph17124360>
- Araiza AM, Lobel M (2018) Stress and eating: definitions, findings, explanations, and implications. *Soc Personal Psychol Compass* 12:e12378. <https://doi.org/10.1111/spc3.12378>
- Aryee P, Helegbe G, Baah B et al (2013) Prevalence and risk factors for overweight and obesity among nurses in the Tamale Metropolis of Ghana. *J Med Biomed Sci* 2:13–23. <https://doi.org/10.4314/jmbs.v2i4.3>
- Błaszczuk-Bębenek E, Jagielski P, Bolesławska I et al (2020) Nutrition behaviors in Polish adults before and during COVID-19 lockdown. *Nutrients* 12:3084. <https://doi.org/10.3390/nu12103084>
- Brown JD, Bobkowski PS (2011) Older and newer media: Patterns of use and effects on adolescents' health and well-being. *J Res Adolesc* 21:95–113. <https://doi.org/10.1111/j.1532-7795.2010.00717.x>
- Cheng SH, Kamil MKM (2020) Stress and food intake among university students - Is there a relationship? *Sains Malaysiana* 49:121–128. <https://doi.org/10.17576/jism-2020-4901-14>
- Choi J (2020) Impact of stress levels on eating behaviors among college students. *Nutrients* 12:1241. <https://doi.org/10.3390/nu12051241>
- Clair R, Gordon M, Kroon M, Reilly C (2021) The effects of social isolation on well-being and life satisfaction during pandemic. *Humanit Soc Sci Commun* 8:28. <https://doi.org/10.1057/s41599-021-00710-3>
- Di Renzo L, Gualtieri P, Pivari F et al (2020) Eating habits and lifestyle changes during COVID-19 lockdown: An Italian survey. *J Transl Med* 18:229. <https://doi.org/10.1186/s12967-020-02399-5>
- Dogan T, Tekin EG, Katrancıoğlu A (2011) Feeding your feelings: a self-report measure of emotional eating. *Procedia - Soc Behav Sci* 15:2074–2077. <https://doi.org/10.1016/j.sbspro.2011.04.056>
- Gallo LA, Gallo TF, Young SL et al (2020) The impact of isolation measures due to COVID-19 on energy intake and physical activity levels in Australian university students. *Nutrients* 12:1865. <https://doi.org/10.3390/nu12061865>
- Global Digital Overview (2020) Digital 2020: Global Digital Overview. <https://wearesocial-net.s3-eu-west-1.amazonaws.com/wp-content/uploads/common/reports/digital-2020/digital-2020-global.pdf>. Accessed 16 Nov 2020
- Güner R, Hasanoglu İ, Aktaş F (2020) Covid-19: Prevention and control measures in community. *Turkish J Med Sci* 50:571–577. <https://doi.org/10.3906/sag-2004-146>
- He M, Xian Y, Lv X et al (2021) Changes in body weight, physical activity, and lifestyle during the semi-lockdown period after the outbreak of COVID-19 in China: an online survey. *Disaster Med Public Health Prep* 15:E23–E28. <https://doi.org/10.1017/dmp.2020.237>
- Hoogstins ES (2017) Modelling on social media: influencing young adults' food choices. Dissertation, Lund University
- Hwang TJ, Rabheru K, Peisah C et al (2020) Loneliness and social isolation during the COVID-19 pandemic. *Int Psychogeriatrics* 32:1217–1220. <https://doi.org/10.1017/S1041610220000988>
- Keser A, Bayindir-Gümüş A, Kutlu H, Öztürk E (2020) Development of the scale of effects of social media on eating behaviour: a study of validity and reliability. *Public Health Nutr* 23:1677–1683. <https://doi.org/10.1017/S1368980019004270>
- Masoud M, Abdeltaweb AK, Abd Elmonem M et al (2019) Prevalence and pattern of social media use and its effect on social health among Fayoum university students. *Int J Community Med Public Heal* 6:904–909. <https://doi.org/10.18203/2394-6040.ijcmph20190571>
- Mattioli AV, Sciomer S, Cocchi C et al (2020) Quarantine during COVID-19 outbreak: changes in diet and physical activity increase the risk of cardiovascular disease. *Nutr Metab Cardiovasc Dis* 30:1409–1417. <https://doi.org/10.1016/j.numecd.2020.05.020>
- Moynihan AB, van Tilburg WAP, Igo ER et al (2015) Eaten up by boredom: consuming food to escape awareness of the bored self. *Front Psychol* 6:369. <https://doi.org/10.3389/fpsyg.2015.00369>
- Murray M, Maras D, Goldfield GS (2016) Excessive time on social networking sites and disordered eating behaviors among undergraduate students: appearance and weight esteem as mediating pathways. *Cyberpsychol Behav Soc Netw* 19:709–715. <https://doi.org/10.1089/cyber.2016.0384>
- Pellegrini M, Ponso V, Rosato R et al (2020) Changes in weight and nutritional habits in adults with obesity during the “lockdown” period caused by the COVID-19 virus emergency. *Nutrients* 12:1–11. <https://doi.org/10.3390/nu12072016>
- Pendergast FJ, Livingstone KM, Worsley A, McNaughton SA (2016) Correlates of meal skipping in young adults: a systematic review. *Int J Behav Nutr Phys Act* 13:125. <https://doi.org/10.1186/s12966-016-0451-1>
- Pitil PP, Ghazali SR (2022) Overweight and obesity: a study among university students in Sarawak. *Int J Heal Promot Educ, Malaysia*. <https://doi.org/10.1080/14635240.2022.2040380>
- Romero-Blanco C, Rodríguez-Almagro J, Onieva-Zafra MD et al (2020) Physical activity and sedentary lifestyle in university students: changes during confinement due to the covid-19 pandemic. *Int J Environ Res Public Health* 17:6567. <https://doi.org/10.3390/ijerph17186567>
- Sağlık Bakanlığı Halk Sağlığı Genel Müdürlüğü [Republic of Türkiye Ministry of Health] (2019) Türkiye Beslenme ve Sağlık Araştırması (TBSA). Sağlık Bakanlığı Yayın No:1132, Ankara
- Sampasa-Kanyinga H, Colman I, Goldfield GS et al (2020) Sex differences in the relationship between social media use, short sleep duration, and body mass index among adolescents. *Sleep Heal* 6:601–608. <https://doi.org/10.1016/j.sleh.2020.01.017>
- Scarmozzino F, Visioli F (2020) Covid-19 and the subsequent lockdown modified dietary habits of almost half the population in an Italian sample. *Foods* 9:675. <https://doi.org/10.3390/foods9050675>

- Sidani JE, Shensa A, Hoffman B et al (2016) The Association between Social Media Use and Eating Concerns among US Young Adults. *J Acad Nutr Diet* 116:1465–1472. <https://doi.org/10.1016/j.jand.2016.03.021>
- Sidor A, Rzymiski P (2020) Dietary choices and habits during COVID-19 lockdown: Experience from Poland. *Nutrients* 12:1657. <https://doi.org/10.3390/nu12061657>
- Villanti AC, Johnson AL, Ilakkuvan V et al (2017) Social media use and access to digital technology in US Young Adults in 2016. *J Med Internet Res* 19:e196. <https://doi.org/10.2196/jmir.7303>
- World Health Organization (2021) Coronavirus disease (COVID-19). <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/question-and-answers-hub/q-a-detail/coronavirus-disease-covid-19>. Accessed 14 Mar 2022
- World Health Organization (2022) Body mass index - BMI. <https://www.euro.who.int/en/health-topics/disease-prevention/nutrition/a-healthy-lifestyle/body-mass-index-bmi>. Accessed 14 Mar 2022
- Zachary Z, Brianna F, Brianna L et al (2020) Self-quarantine and weight gain related risk factors during the COVID-19 pandemic. *Obes Res Clin Pract* 14:210–216. <https://doi.org/10.1016/j.orcp.2020.05.004>
- Zamsad M, Banik S, Ghosh L (2019) Prevalence of overweight, obesity and abdominal obesity in Bangladeshi university students: a cross-sectional study. *Diabetes Metab Syndr* 13:480–483. <https://doi.org/10.1016/j.dsx.2018.11.015>
- Zeeni N, Doumit R, Abi Kharma J, Sanchez-Ruiz MJ (2018) Media, technology use, and attitudes: associations with physical and mental well-being in youth with implications for evidence-based practice. *Worldviews Evidence-Based Nurs* 15:304–312. <https://doi.org/10.1111/wvn.12298>

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