Article

Not peer-reviewed version

The Impact of Social Media Usage on Food Choice Motivations and Dietary Carbon Footprints in Adolescents: A Cross-Sectional Study

Hande Seven Avuk * , Tugce Ozlu Karahan , Ezgi Sarigil , Nil Pinar , Ayse Terzi , Nursena Dirinli , Emre Batuhan Kenger

Posted Date: 26 February 2026

doi: 10.20944/preprints202602.1662.v1

Keywords: adolescent; carbon footprint; food choice; social media; sustainable nutrition

Article

The Impact of Social Media Usage on Food Choice Motivations and Dietary Carbon Footprints in Adolescents: A Cross-Sectional Study

Hande Seven Avuk [1,*], Tugce Ozlu Karahan [2], Ezgi Sarigil [1], Nil Pinar [1], Ayse Terzi [1], Nursena Dirinli [1] and Emre Batuhan Kenger [1]

[1] Istanbul Bilgi University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Istanbul, Türkiye

[2] Health Sciences University, Hamidiye Faculty of Health Sciences, Department of Nutrition and Dietetics, Istanbul, Türkiye

* Correspondence: hande.seven@bilgi.edu.tr; Tel.: +90 530 330 26 03

Abstract

Social media has become a powerful tool shaping adolescents' food preferences and consequently the environmental impacts of their diets. This study aimed to examine the relationship between social media usage habits, food choice motivations, and the environmental impact of the diet, specifically the carbon footprint, in adolescents. This cross-sectional study was conducted with 216 adolescents aged 14–18 years in Istanbul between January and April 2025. Data were collected using the Food Choice Questionnaire (FCQ) and a 24-hour dietary recall. The dietary carbon footprint was calculated using the Data FIELDS database and scientific literatüre. Of the participants, 60.6% were female. Females had significantly higher rates of being influenced by social media in food choices ($p < 0.001$) and total FCQ scores ($p = 0.025$) compared to males. Regarding social media platforms, TikTok usage was associated with higher ethical concern and mood scores ($p < 0.001$), while Instagram usage was associated with weight control ($p = 0.012$). Daily internet use of 180 minutes was associated with higher price ($p = 0.001$) and weight control ($p = 0.003$) motivations. Notably, a significant negative correlation was found between health motivation and carbon footprint ($r = -0.173$, $p = 0.011$). Multivariate regression analysis confirmed that an increase in health score was associated with a reduction in carbon footprint ($\beta = -0.204$, $p = 0.003$), independent of gender, BMI, and social media influence. Social media platforms serve as a determinant digital environment in adolescents' food preferences. The finding that health-oriented choices reduce carbon footprints indicates that promoting healthy eating on social media will benefit both individual and planetary health.

Keywords: adolescent; carbon footprint; food choice; social media; sustainable nutrition

---

1. Introduction

The food system has been identified as a major contributor to climate change, and the primary sources of greenhouse gas emissions are nitrous oxide from soils, methane from enteric fermentation in animals, and carbon dioxide resulting from land-use changes such as deforestation (Röös, 2013). Water and carbon footprint calculation methods are employed to determine the environmental impacts of foods and dietary patterns. Foods with lower water and carbon footprints have a reduced environmental impact. The carbon footprint of a food product is the total greenhouse gas emissions generated throughout its production, transportation, storage, processing, packaging, preparation, and consumption. Meat products have a significantly higher carbon footprint compared to grain or vegetable products (Takacs et al., 2022).

As a powerful tool shaping consumer behavior, social media influences individuals' food preferences (Özkan et al., 2024). Health awareness campaigns on social media play a significant role

 doi:10.20944/preprints202602.1662.v1

in shaping user behavior. For instance, food-related content shared on platforms such as Twitter, YouTube, and Instagram may reflect broader dietary trends in society. Research has demonstrated that food-related tweets shared by users are associated with obesity rates (Abbar et al., 2015). Social media has evolved into a platform that influences individuals' sustainability awareness and behaviors in a multifaceted manner. Social media, where topics ranging from recipes to eco-friendly dietary habits are disseminated, can shape the understanding of sustainability at both individual and societal levels (Vilkaite-Vaitone, 2024). Ethical and healthy food content deliberately disseminated on social media may enable individuals to make more conscious, sustainable choices in the long term (Solanki & Mahajan, 2023). In light of this information, this study aimed to evaluate the potential effects of adolescents' social media usage habits on their food choice behaviors and carbon footprints.

2. Materials and Methods

2.1. Study Design and Participants

This cross-sectional study was conducted between January and April 2025 with 216 adolescents aged 14–18 attending high schools in Istanbul. The sample size was determined using a priori power analysis via G*Power 3.1.9.4 software (Faul et al., 2007). Based on a medium effect size, a 95% confidence interval (alpha = 0.05), and 95% power (1−β = 0.95), the minimum sample size required for the study was calculated as 216. Adolescents falling outside the 14–18 age range, following a specific medical diet, declining to participate, or providing incomplete data were excluded from the study. The STROBE flow diagram of the study is presented in Figure 1.

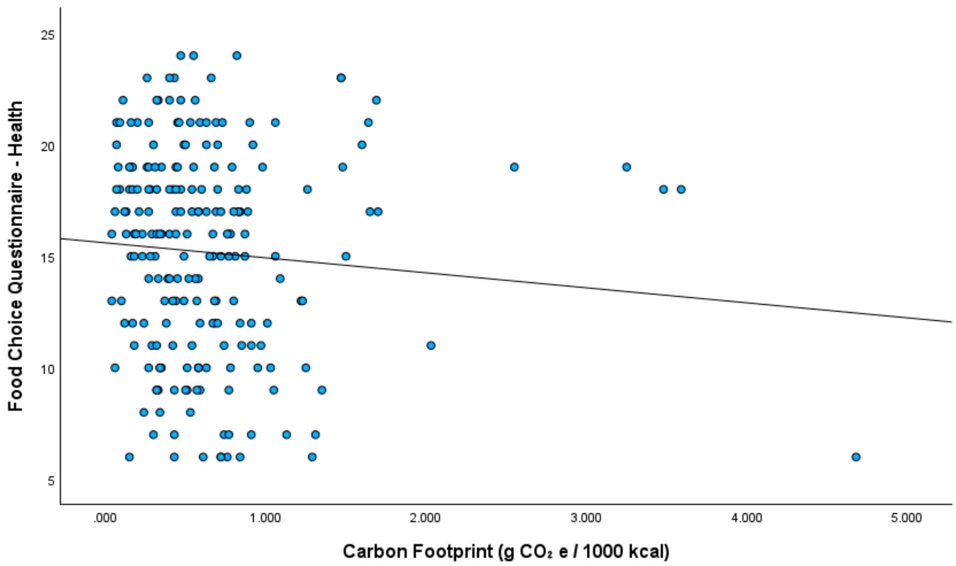

Figure 1. Relationship between health subscale score of food choice questionnaire and carbon footprint.

Ethical approval for the study was obtained from the Istanbul Bilgi University Human Research Ethics Committee in accordance with the Declaration of Helsinki (Approval No: 2024–10160208, Date: 20.12.2024). Prior to data collection, researchers visited classrooms to inform potential participants about the study's objectives and procedures. During these sessions, the questionnaire content and necessary information were outlined, with strong emphasis on the voluntary nature of participation. Students were requested to obtain written informed consent from their parents. The participant recruitment process was completed upon the collection of these signed consent forms.

2.2. Data Collection Tools

The questionnaires were administered face-to-face, and researchers provided guidance in the classroom throughout the process to avoid any potential confusion. The research instrument consisted of three sections: sociodemographic data and anthropometric measurements, the Food Choice Questionnaire (FCQ), and a 24-hour dietary recall. Based on the collected data, daily dietary carbon footprints were calculated for each participant.

Survey Form: Information on adolescents' age, gender, education level, dietary habits, social media use, and regular physical activity status was collected through the survey form.

Anthropometric Measurements: Participants' heights were measured while standing barefoot on a flat surface, with their heads in the Frankfort horizontal plane (WHO, 1995). Body weight was measured and recorded to the nearest 50 g using a TANITA BC-601 portable digital body composition monitor, with participants wearing light clothing and no shoes. Body Mass Index (BMI) was calculated by dividing body weight by the square of height (meters) (WHO, 2004).

Food Choice Questionnaire (FCQ): The FCQ is a 36-item questionnaire comprising 9 sub-dimensions that assess intrinsic and extrinsic food attributes that motivate food choices. The scale was initially developed by Steptoe et al. (1995), and its validity and reliability for the Turkish population were established by Dikmen et al. (2016). The sub-dimensions of the scale are health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity, and ethical concern. In the FCQ, participants are asked to rate the importance of each item for their food choices on a typical day using a 4-point Likert scale (1 = "not at all important", 2 = "a little important", 3 = "moderately important", 4 = "very important")—the intraclass correlation coefficients (ICCs) of the original scale range from 0.89 to 0.95.

Dietary Assessment: Participants' dietary intake was evaluated using a 24-hour dietary recall. The Nutrition Information Systems (BeBiS) software (Full version 8.2) was used to calculate the individuals' macro- and micronutrient intake levels.

Calculation of Carbon Footprint: A comprehensive national Life Cycle Assessment (LCA) database reflecting the environmental impacts of foods specific to Turkey is not yet available. Therefore, this study used the "Data FIELDS" (Food Impacts on the Environment for Linking to Diets) database (Heller et al., 2018), which presents the environmental impacts of foods in standardized categories and is based on life-cycle assessment literature. Although absolute emission values vary depending on geographical conditions, it was assumed that the proportional differences between food groups (e.g., animal sources having significantly higher emissions than plant sources) are globally consistent. Thus, this database was accepted as a valid tool for comparing dietary patterns. In addition to the database, current average carbon footprint values published in the scientific literature were also utilized for the calculations (Heller & Keoleian, 2015; Clune, Crossin, and Verghese, 2017; Durlu-Özkaya et al., 2024). The emission factors, defined in the literature per kilogram (kg CO2-eq/kg product), were applied to the portion sizes from participants' 24-hour dietary recalls and converted to grams (g CO2-eq/g product). To evaluate the diet's total environmental impact independent of energy intake, participants' carbon footprint values were standardized and calculated per 1000 kcal. Spices and other flavorings present at trace levels were excluded from the analysis due to insufficient emission factors and their negligible contribution to the total carbon footprint.

2.3. Statistical Analysis

The data obtained in the study were analyzed using SPSS (Statistical Package for the Social Sciences) for Windows, version 30.0. Normally distributed data were expressed as mean ± standard deviation, while non-normally distributed data were expressed as median (minimum–maximum). Categorical variables were presented as counts and percentages. Data distribution normality was assessed using the Kolmogorov-Smirnov test. For comparisons between two groups, the independent-samples t-test was used for normally distributed continuous variables, and the Mann–Whitney U test was used for non-normally distributed continuous variables. The relationships between categorical variables were evaluated using the Chi-square test. The relationships between

Preprints.org (www.preprints.org) | NOT PEER-REVIEWED | Posted: 26 February 2026 doi:10.20944/preprints202602.1662.v1

carbon footprint per energy and energy/nutrient intake were examined using Spearman's correlation analysis. Multivariate linear regression analysis was performed to evaluate the independent effect of the health sub-dimension of the Food Choice Questionnaire on carbon footprint. Prior to the multivariate linear regression analysis, the carbon footprint variable was logarithmically transformed to approximate normality. Following the crude model, adjustments were made sequentially for gender (Model 1), body mass index (Model 2), the influence of social media on food choice (Model 3), and internet usage status (Model 4). Regression results were reported as standardized beta coefficients, 95% confidence intervals, and *p*-values. Statistical significance was set at $p < 0.05$ for all analyses.

3. Results

The study sample consisted of 216 adolescents with a mean age of 16.9 ± 0.94 years (60.6% female; 39.4% male). When general characteristics were examined, 63.9% of those engaging in regular physical activity were male, whereas 70.3% of those who did not were female ($p < 0.001$). Of those who believed social media influenced their food choices, 72.0% were female, while only 28.0% were male ($p < 0.001$). Similarly, the vast majority (65.9%) of those stating that food advertisements on social media triggered hunger were female ($p = 0.011$). The rates of following dietitians and reading nutrition-related articles were significantly higher in females than in males ($p < 0.05$). Carbon footprint tertiles did not differ significantly between genders ($p = 0.532$). In the Food Choice Questionnaire (FCQ), the total score was significantly higher for females compared to males (96.9 ± 17.2 vs. 91.8 ± 20.7; $p = 0.025$). Specifically, female scores were significantly higher in the sub-dimensions of mood (17.1 ± 4.3 vs. 15.2 ± 4.8; $p = 0.002$), sensory appeal (13.0 ± 2.3 vs. 12.1 ± 2.8; $p = 0.007$), natural content (6.8 ± 2.4 vs. 6.1 ± 2.3; $p = 0.031$), ethical concern (6.9 ± 2.5 vs. 6.2 ± 2.7; $p = 0.045$), and weight control (6.9 ± 2.9 vs. 6.2 ± 2.5; $p = 0.033$). Carbon footprint tertiles did not differ significantly between genders ($p = 0.532$) (Table 1).

Table 1. General characteristics of participants.

Characteristics	Female (*n* = 131)	Male (*n* = 85)	Toplam (*n* = 216)	*p*-Value
Age (years)	17.0 (17.0–17.0)	17.0 (16.0–17.0)	17.0 (17.0–17.0)	**0.031**
Body weight (kg)	57.0 (50.0–62.0)	75.0 (67.0–87.0)	61.0 (55.0–70.0)	**<0.001**
Body mass index (kg/m²)	21.1 ± 2.7	23.7 ± 3.8	22.1 ± 3.4	**<0.001**
Regular physical activity				**<0.001**
Yes	22 (36.1)	39 (63.9)	61 (28.2)	
No	109 (70.3)	46 (29.7)	155 (71.8)	
Internet usage (daily)				0.891
<60 minutes	17 (56.7)	13 (43.3)	30 (13.9)	
60–180 minutes	65 (61.3)	41 (38.7)	106 (49.1)	
≥180 minutes	49 (61.3)	31 (38.7)	80 (37.0)	
Following nutrition-related pages on social media platforms				0.061
Yes	45 (69.2)	20 (30.8)	65 (30.1)	
No	86 (57.0)	65 (43.0)	151 (69.9)	
Nutrition-related videos appearing on Explore page				0.084
Yes	62 (66.0)	32 (34.0)	94 (43.5)	
No	14 (43.8)	18 (56.2)	32 (14.8)	
Sometimes	55 (61.1)	35 (38.9)	90 (41.7)	
Thinking that social media has an influence on food choice preferences				**<0.001**
Yes	72 (72.0)	28 (28.0)	100 (46.3)	
No	28 (40.0)	42 (60.0)	70 (32.4)	

Undecided	31 (67.4)	15 (32.6)	46 (21.3)	
The effect of food ads you see on social media on your hunger levels				**0.011**
Yes	58 (65.9)	30 (34.1)	88 (40.7)	
No	19 (41.3)	27 (58.7)	46 (21.3)	
Sometimes	54 (65.9)	28 (34.1)	82 (38.0)	
Following nutritionists on social networks				**0.036**
Yes	42 (71.2)	17 (28.8)	59 (27.3)	
No	89 (56.7)	68 (43.3)	157 (72.7)	
The reading of nutrition-related articles that you come across on social media				**<0.001**
Yes	70 (74.5)	24 (25.5)	94 (43.5)	
No	61 (50.0)	61 (50.0)	122 (56.5)	
FCQ				
Health	15.5 ± 4.4	14.5 ± 5.0	15.1 ± 4.7	0.068
Mood	17.1 ± 4.3	15.2 ± 4.8	16.4 ± 4.6	**0.002**
Convenience	14.4 ± 3.4	14.4 ± 3.7	14.5 ± 3.5	0.497
Sensory Appeal	13.0 ± 2.3	12.1 ± 2.8	12.7 ± 2.5	**0.007**
Natural Content	6.8 ± 2.4	6.1 ± 2.3	6.5 ± 2.4	**0.031**
Price	8.1 ± 2.6	8.6 ± 2.6	8.3 ± 2.6	0.064
Weight Control	6.9 ± 2.9	6.2 ± 2.5	6.7 ± 2.8	**0.033**
Familiar	8.1 ± 2.2	8.0 ± 2.2	8.1 ± 2.2	0.478
Ethical Concern	6.9 ± 2.5	6.2 ± 2.7	6.6 ± 2.6	**0.045**
Total FCQ	96.9 ± 17.2	91.8 ± 20.7	94.9 ± 18.8	**0.025**
Carbon Footprint (g CO2 e/1000 kcal)	0.42 (0.26–0.66)	0.46 (0.33–0.71)	0.45 (0.30–0.68)	0.092
Carbon Footprint Tertiles				0.532
T1	47 (65.3)	25 (34.7)	72 (33.3)	
T2	41 (56.2)	32 (43.8)	73 (33.8)	
T3	43 (60.6)	28 (39.4)	70 (32.4)	
Energy and Nutrients				
Energy (kcal/day)	1027.2 (764.7–1350.7)	1402.7 (1067.9–1712.7)	1131.2 (885.6–1508.3)	**<0.001**
Carbohydrate (%)	46.0 (40.0–53.0)	46.0 (40.5–54.5)	46.0 (40.0–54.0)	0.419
Protein (%)	15.0 (12.0–19.0)	17.0 (13.5–20.0)	16.0 (12.3–19.0)	**0.008**
Fat (%)	38.1 ± 8.1	34.9 ± 9.7	36.7 ± 8.9	**0.005**
Fiber (g)	10.1 (6.7–13.0)	11.2 (8.1–15.6)	10.5 (7.1–14.7)	**0.016**
Folate (mcg)	133.0 (91.6–194.3)	166.1 (97.4–237.8)	149.5 (92.8–216.1)	**0.031**
Vitamin B12 (mcg)	1.6 (0.8–3.2)	2.6 (1.5–5.1)	1.9 (1.0–4.2)	**<0.001**
Vitamin C (mg)	41.3 (22.3–81.5)	35.8 (16.4–62.0)	39.8 (20.0–72.2)	**0.152**
Potassium (mg)	1354.4 ± 600.3	1584.4 ± 825.3	1444.9 ± 704.8	**0.009**
Calcium (mg)	323.1 (216.2–489.5)	397.0 (243.7–540.8)	346.9 (227.1–512.2)	**0.026**
Magnesium (mg)	148.4 (93.9–185.6)	178.2 (121.9–217.7)	157.3 (104.4–198.4)	**0.001**
Zinc (mg)	4.9 (3.5–7.4)	7.2 (4.9–10.2)	5.6 (4.1–8.7)	**<0.001**
Iron (mg)	5.9 ± 2.4	7.7 ± 3.6	6.6 ± 3.1	**<0.001**

Continuous variables showing a normal distribution are expressed as mean ± standard deviation; those not showing a normal distribution are expressed as median (25th-75th percentile); categorical variables are expressed as number (percentage). Independent samples T-test or Mann Whitney U test was used for continuous variables, and Chi-square test was used for categorical variables. Statistical significance is $p < 0.05$ and is indicated in bold.

When adolescents' food choices and carbon footprints were evaluated by internet usage, the total food choice score was significantly higher in individuals with daily internet use of ≥180 minutes than

 doi:10.20944/preprints202602.1662.v1

in those with <180 minutes (97.8 ± 18.5 vs. 93.2 ± 18.8; *p* = 0.042). In this group, the scores for price (9.0 ± 2.4 vs. 7.9 ± 2.7; *p* = 0.001) and weight control (7.4 ± 3.0 vs. 6.3 ± 2.6; *p* = 0.003) sub-dimensions were significantly higher. The total food choice score of TikTok users was higher than that of non-users (99.1 ± 19.8 vs. 91.6 ± 17.4; *p* = 0.002). Additionally, the health (16.0 ± 4.3 vs. 14.3 ± 4.8; *p* = 0.005), mood (17.9 ± 4.6 vs. 15.1 ± 4.3; *p* < 0.001), and ethical concern (7.2 ± 2.7 vs. 6.1 ± 2.5; *p* < 0.001) sub-dimensions were significantly higher in TikTok users. Among Instagram users, health (15.7 ± 4.7 vs. 13.9 ± 4.5; *p* = 0.004), weight control (7.0 ± 2.7 vs. 6.1 ± 2.8; *p* = 0.012), and total food choice scores (96.5 ± 19.3 vs. 91.9 ± 17.6; *p* = 0.042) were found to be higher. In individuals using X, the price score was significantly higher (9.8 ± 2.0 vs. 8.2 ± 2.6; *p* = 0.018) (Table 2).

Table 2. Food choice questionnaire and carbon footprint values of adolescents according to their daily internet and social media platform usage.

	Internet Usage			TikTok			Instagram			X (formerly Twitter)		
FCQ	**<180 minutes (*n* = 136)**	**≥180 minutes (*n* = 80)**	***p*-Value**	**Yes (*n* = 94)**	**No (*n* = 122)**	***p*-Value**	**Yes (*n* = 142)**	**No (*n* = 74)**	***p*-Value**	**Yes (*n* = 13)**	**No (*n* = 203)**	***p*-Value**
Health	14.9 ± 4.7	15.3 ± 4.5	0.271	16.0 ± 4.3	14.3 ± 4.8	**0.005**	15.7 ± 4.7	13.9 ± 4.5	**0.004**	14.6 ± 5.8	15.1 ± 4.6	0.345
Mood	16.1 ± 4.6	16.9 ± 4.6	0.086	17.9 ± 4.6	15.1 ± 4.3	**<0.001**	16.6 ± 4.5	15.8 ± 4.7	0.112	15.8 ± 5.7	16.4 ± 4.5	0.331
Convenience	14.2 ± 3.5	14.7 ± 3.5	0.142	14.5 ± 3.5	14.4 ± 3.5	0.412	14.6 ± 3.6	14.2 ± 3.3	0.197	15.8 ± 4.7	14.3 ± 3.4	0.072
Sensory Appeal	12.8 ± 2.6	12.6 ± 2.5	0.353	12.8 ± 2.8	12.5 ± 2.3	0.194	12.8 ± 2.5	12.3 ± 2.5	0.094	12.7 ± 3.1	12.6 ± 2.5	0.461
Natural Content	6.4 ± 2.4	6.7 ± 2.4	0.195	6.6 ± 2.4	6.5 ± 2.4	0.332	6.6 ± 2.4	6.3 ± 2.3	0.173	6.8 ± 2.0	6.5 ± 2.4	0.306
Price	7.9 ± 2.7	9.0 ± 2.4	**0.001**	8.5 ± 2.8	8.2 ± 2.5	0.218	8.2 ± 2.6	8.5 ± 2.7	0.196	9.8 ± 2.0	8.2 ± 2.6	**0.018**
Weight Control	6.3 ± 2.6	7.4 ± 3.0	**0.003**	7.0 ± 2.9	6.5 ± 2.7	0.078	7.0 ± 2.7	6.1 ± 2.8	**0.012**	6.5 ± 2.8	6.7 ± 2.8	0.378
Familiar	8.1 ± 2.2	8.0 ± 2.2	0.388	8.3 ± 2.3	7.8 ± 2.1	0.052	8.0 ± 2.3	8.1 ± 2.1	0.378	8.5 ± 2.4	8.0 ± 2.2	0.258
Ethical Concern	6.4 ± 2.5	6.9 ± 2.7	0.112	7.2 ± 2.7	6.1 ± 2.5	**<0.001**	6.7 ± 2.6	6.5 ± 2.7	0.272	6.9 ± 2.6	6.6 ± 2.7	0.346
Total FCQ	93.2 ± 18.8	97.8 ± 18.5	**0.042**	99.1 ± 19.8	91.6 ± 17.4	**0.002**	96.5 ± 19.3	91.9 ± 17.6	**0.042**	97.6 ± 20.5	94.7 ± 18.7	0.298
Carbon Footprint (g CO_2 e/1000 kcal)	0.42 (0.31–0.66)	0.49 (0.28–0.70)	0.397	0.46 (0.32–0.67)	0.44 (0.29–0.68)	0.561	0.43 (0.28–0.67)	0.46 (0.33–0.73)	0.197	0.59 (0.28–0.78)	0.44 (0.31–0.67)	0.339

Continuous variables showing a normal distribution are expressed as mean ± standard deviation; those not showing a normal distribution are expressed as median (25th-75th percentile). Independent samples T-test or Mann Whitney U test was used. Statistical significance is $p < 0.05$ and is indicated in bold.

A weak but statistically significant negative correlation was found between the carbon footprint and the health sub-dimension of the Food Choice Questionnaire (r = −0.173; *p* = 0.011) (Figure 1). In contrast, no significant relationship was observed between the other sub-dimensions of food choice and the carbon footprint per 1000 kcal (*p* > 0.05; Supplementary File 1). In the multivariate linear regression analysis examining the effect of the health sub-dimension of the Food Choice Questionnaire on carbon footprint, a negative, statistically significant relationship was observed between the health score and carbon footprint. In the crude model, the health score was inversely associated with the carbon footprint (β = −0.197; *p* = 0.004). This relationship remained significant in Model 1 adjusted for gender (β = −0.185; *p* = 0.006), Model 2 adjusted for gender and BMI (β = −0.191; *p* = 0.005), Model 3 adjusted for gender, BMI, and the influence of social media on food choice (β =−0.204; *p* = 0.003), and Model 4 adjusted for gender, BMI, the influence of social media on food choice, and internet usage status (β = −0.204; *p* = 0.003). The inclusion of internet usage in the model did not alter the coefficient or the direction of the relationship (Table 3).

Preprints.org (www.preprints.org) | NOT PEER-REVIEWED | Posted: 26 February 2026 doi:10.20944/preprints202602.1662.v1

Table 3. Multivariate linear regression models examining the effect of the health subscale score of the food choice questionnaire on carbon footprint.

		Carbon footprint (g CO2 e/1000 kcal)				
		β	T	95% Confidence Interval		*p*-Value
				Lower	Upper	
FCQ - Health Score	Crude	−0.197	−2.933	−0.329	−0.064	**0.004**
	Model 1	−0.185	−2.753	−0.317	−0.052	**0.006**
	Model 2	−0.191	−2.841	−0.324	−0.059	**0.005**
	Model 3	−0.204	−3.035	−0.336	−0.071	**0.003**
	Model 4	−0.204	−3.029	−0.336	−0.071	**0.003**

Model 1: Adjusted for gender (R2 = 0.053; $p = 0.003$). Model 2: Adjusted for gender and BMI (R2 = 0.058; $p = 0.005$). Model 3: Adjusted for gender, BMI, and the influence of social media on food choice (R2 = 0.075; $p = 0.002$). Model 4: Adjusted for gender, BMI, the influence of social media on food choice, and internet usage status (R2 = 0.075; $p = 0.005$).

4. Discussion

This study aimed to examine the relationship between social media usage habits, food choice motivations, and the dietary carbon footprint—an indicator of the environmental impact of diet—among adolescents. The findings reveal that social media, and particularly health perception, play a key role in sustainable dietary behaviors.

Adolescents' dietary behaviors cannot be considered independently of their physical and social environments. In a study examining the factors affecting food intake in children and adolescents, Gubbels (2020) emphasizes that the media creates a 'food environment' that is just as determinant as the physical environment. The significant impact of social media (TikTok, Instagram) on food choice motivations observed in our study represents the digital equivalent of this environmental determinant concept highlighted by Gubbels. Through the visual and auditory stimuli it provides, social media reshapes not only what adolescents eat but also the meanings they attribute to food, such as ethics, mood, and health.

In our study, it was observed that female participants were significantly more influenced by social media compared to males, followed dietitians at a higher rate, and exhibited significantly higher scores in the weight control, mood, and natural content sub-dimensions. This finding aligns with the literature indicating that females are more susceptible to health and body-image messages (Özkan et al., 2024; Feraco et al., 2024). Indeed, current research reports increased body dissatisfaction and eating disorder symptoms among females who follow nutrition-focused influencers on Instagram (Bocci Benucci et al., 2024; Roorda & Cassin, 2025; Issa et al., 2025; Lowe-Calverley & Grieve, 2021). In our study, the high weight control scores observed in females can be interpreted as a reflection of social media's impact on body image.

When examined on a platform basis, the effects appear to vary. The high scores for health and ethical concerns among TikTok users suggest that this group may possess the potential for mindful eating. In fact, the literature indicates that positive and mindful approaches to eating are associated with healthy food choices (Sob et al., 2023) and can shape sustainable dietary behaviors (Stanszus et al., 2019). Among Instagram users, the high motivation for 'weight control' aligns with the platform's visually visual-oriented nature and the risk of Orthorexia Nervosa (Christodoulou et al., 2024). Furthermore, the increase in price and weight control scores observed as daily internet usage exceeds 180 minutes highlights the paradoxical effect of digital exposure. The literature emphasizes that this relationship is neither unidimensional nor linear. Indeed, influencer interactions can sometimes guide individuals toward healthy choices through a prevention-focused motivation (De Jans et al., 2022), while at other times they may harm psychological well-being, even when dietary quality improves (Cooper et al., 2024). However, the nature of the exposed content plays a determinant role and may pave the way for positive behavioral transformations in long-term interactions (Breves et al., 2025).

 doi:10.20944/preprints202602.1662.v1

The most critical finding of our study is that as the health motivation in food choice increases, the dietary carbon footprint decreases significantly. This result corroborates the "One Health" approach and the Barilla Double Pyramid model, which holds that healthy eating and eco-friendly nutrition support each other (Ruini et al., 2015). The principle that plant-based foods recommended for health have lower carbon emissions is further supported by correlations between healthy, sustainable behaviors and young adults (Żakowska-Biemans et al., 2019). A study conducted in Turkey also emphasizes that increasing food literacy guides individuals toward conscious and sustainable consumption (Yavuz et al., 2025).

The importance of this study becomes clearer when trends across Turkey are considered. The trend analysis by İlhan et al. (2025), based on Turkey Nutrition and Health Survey (TBSA) data, indicates that Türkiye's carbon footprint increased by 16.1% between 2010 and 2017, driven by red meat consumption, while fruit and vegetable consumption declined. While the environmental impact improved over time in Germany (van de Locht et al., 2024), the negative trend in Türkiye underscores the importance of conducting national studies. Furthermore, the significantly higher carbon footprint of males in national data (Ilhan et al., 2023) supports our finding that females tend toward lower-carbon choices driven by health and natural content motivations. Adolescents shifting toward plant-based diets due to health concerns could be an effective strategy to reverse this negative environmental trend in Türkiye.

Although the carbon footprint-reducing effect of health motivation is promising, the literature reminds us that this relationship must be carefully managed to ensure nutrient adequacy. The simulation study by Temme et al. (2015) revealed that environmentally sustainable diets, while improving health, may pose risks regarding the intake of critical micronutrients such as iron and zinc. Similarly, van de Locht et al. (2024) reported that environmental sustainability may not always go hand in hand with nutrient adequacy. Therefore, strict carbon footprint reduction targets should be set without disregarding adolescents' developmental needs.

Several limitations should be considered when evaluating the results of this study. First, the cross-sectional design of the study prevents establishing causal relationships between variables, and the findings reflect the situation only within a specific timeframe. Second, the sample group consisted of adolescents studying in Istanbul, which may limit the generalizability of the results to the entire adolescent population in Turkey in terms of socio-cultural diversity. Third, collecting food consumption data via the 24-hour dietary recall method carries the risk of recall bias due to memory factors and may result in single-day data that do not fully reflect the individual's overall dietary habits. Finally, the use of the internationally valid "Data FIELDS" database and average values from the literature, due to the lack of a comprehensive food carbon footprint database specific to Turkey, may have led to specific emission differences arising from local production and logistics conditions not being fully reflected in the analyses.

5. Conclusion

In conclusion, social media use among adolescents alters food choice motivations depending on the platform. The carbon footprint-reducing effects of health-oriented dietary choices are valuable co-benefits in public health interventions. However, when developing sustainable nutrition strategies, careful planning is required to prevent nutrient deficiencies. In the future of nutrition, there is a need for holistic education models based on sustainability that do not separate individual health from planetary health. Increasing 'sustainable and conscious nutrition' content on social media platforms can be an effective tool in combating both obesity and climate change.

Supplementary Materials: The following supporting information can be downloaded at the website of this paper posted on Preprints.org. Table S1: Relationship between carbon footprint per energy unit and food choice questionnaire scores in adolescents.

Author Contributions: Conceptualization, H.S.A., E.S., N.P., A.T., and N.D.; data curation, E.S., N.P., A.T., and N.D.; formal analysis, H.S.A., T.O.K. and E.B.K.; investigation, H.S.A., E.S., N.P., A.T., and N.D.; methodology, H.S.A., E.S., N.P., A.T., and N.D.; resources, H.S.A., E.S., N.P., A.T., and N.D.; software, E.S., N.P., A.T., and N.D.; supervision, H.S.A.; visualization, H.S.A., T.O.K. and E.B.K.; writing—original draft, H.S.A., E.S., T.O.K., N.P., A.T., N.D., and E.B.K; writing—review and editing, H.S.A., T.O.K. and E.B.K; project administration, H.S.A; funding acquisition, H.S.A., E.S., N.P., A.T., and N.D. All authors have read and agreed to the published version of the manuscript.

Funding: This study received financial support from the Scientific and Technological Research Council of Türkiye (TÜBİTAK) 2209-A Program.

Institutional Review Board Statement: Ethical approval for the study was obtained from the Istanbul Bilgi University Human Research Ethics Committee in accordance with the Declaration of Helsinki (Approval No: 2024-10160208, Date: 20.12.2024).

Informed Consent Statement: Informed consent was obtained from all students' parents included in the study.

Acknowledgments: The authors would like to thank the Scientific and Technological Research Council of Türkiye (TÜBİTAK) for their financial support under the 2209-A University Students Research Projects Support Program.

Data Availability Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest: The authors declare no conflicts of interest.

References

1. Abbar, S., Mejova, Y., & Weber, I. (2015, April). You tweet what you eat: Studying food consumption through twitter. In Proceedings of the 33rd annual acm conference on human factors in computing systems (pp. 3197–3206). http://dx.doi.org/10.1145/2702123.2702153
2. Bocci Benucci, S., Fioravanti, G., Silvestro, V., Spinelli, M. C., Brogioni, G., Casalini, A., ... & Rotella, F. (2024). The impact of following Instagram influencers on women's body dissatisfaction and eating disorder symptoms. Nutrients, 16(16), 2730. https://doi.org/10.3390/nu16162730
3. Breves, P. L., Boerman, S. C., Stein, J. P., Ischen, C., & van Berlo, Z. M. (2025). The impact of body-positive and fitspirational influencers on body satisfaction: a longitudinal study of evolving parasocial relationships. Human Communication Research, hqaf029. https://doi.org/10.1093/hcr/hqaf029
4. Christodoulou, E., Markopoulou, V., & Koutelidakis, A. E. (2024). Exploring the link between mindful eating, Instagram engagement, and eating disorders: A focus on orthorexia nervosa. Psychiatry International, 5(1), 27–38. https://doi.org/10.3390/psychiatryint5010003
5. Clune, S., Crossin, E., & Verghese, K. (2017). Systematic review of greenhouse gas emissions for different fresh food categories. Journal of cleaner production, 140, 766–783. https://doi.org/10.1016/j.jclepro.2016.04.082
6. Cooper, J., Campbell, Q., & Conner, T. (2024). Healthier but not happier? The lifestyle habits of health influencer followers. Cyberpsychology: Journal of Psychosocial Research on Cyberspace, 18(2). https://doi.org/10.5817/CP2024–2-4
7. De Jans, S., Hudders, L., Naderer, B., & De Pauw, V. (2022). Impact of thin-ideals in influencer posts promoting healthy vs. unhealthy foods on tweens' healthy food choice behavior. Frontiers in Psychology, 13, 789069. https://doi.org/10.3389/fpsyg.2022.789069
8. Dikmen D, İnan-Eroğlu E, Göktaş Z, Barut-Uyar B, Karabulut E. Validation of a Turkish version of the food choice questionnaire. Food Qual Prefer. 2016; 52: 81–86. https://doi.org/10.1016/j.foodqual.2016.03.016
9. Durlu-Özkaya, F., Varol, M. B., Coşkun, S., & Budak, N. H. (2024). Determination of Carbon Footprint of Ankara's Geographically Indicated Foods. Eskişehir Osmangazi University Journal of Social Sciences, 25(3), 676–688. https://doi.org/10.17494/ogusbd.1541946

10. Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. Behavior Research Methods, 39(2), 175–191. https://doi.org/10.3758/BF03193146
11. Feraco, A., Armani, A., Amoah, I., Guseva, E., Camajani, E., Gorini, S., ... & Lombardo, M. (2024). Assessing gender differences in food preferences and physical activity: a population-based survey. Frontiers in Nutrition, 11, 1348456. https://doi.org/10.3389/fnut.2024.1348456
12. Fresán, U., Mejia, M. A., Craig, W. J., Jaceldo-Siegl, K., & Sabaté, J. (2019). Meat Analogs from Different Protein Sources: A Comparison of Their Sustainability and Nutritional Content. Sustainability, 11(12), 3231. https://doi.org/10.3390/su11123231
13. Gubbels, J. S. (2020). Environmental influences on dietary intake of children and adolescents. Nutrients, 12(4), 922. https://doi.org/10.3390/nu12040922
14. Heller, M. C., & Keoleian, G. A. (2015). Greenhouse gas emission estimates of US dietary choices and food loss. Journal of Industrial Ecology, 19(3), 391–401. https://doi.org/10.1111/jiec.12174
15. Heller, M.C.; Willits-Smith, A.; Meyer, R.; Keoleian, G.A.; Rose, D. Greenhouse gas emissions and energy use associated with production of individual self-selected US diets. Environ. Res. Lett. 2018, 13, 044004. https://doi.org/10.1088/1748-9326/aab0ac
16. Ilhan, A., Yenicag, R., Yalcin Pehlivan, E., Ozturk, E., Karahan, S., & Rakıcıoğlu, N. (2023). Greenhouse gas emission and water footprint of the national diet in Turkey: Results from Turkey nutrition and health survey 2017. Sustainability, 15(12), 9768. https://doi.org/10.3390/su15129768
17. Issa, W. B., Abdelrahim, D. N., Zaid, S. H., Taheri, M. A., Alhooti, B. K., Alahmed, G. N., ... & Ahmed, F. R. (2025). Social Media Influencers and Young Women's Body Image: Implications for Public Health. Public Health Nursing. https://doi.org/10.1111/phn.70047
18. İlhan, G. O., Tokmak, A., & Aktaş, V. (2025). Outdoor Learning in Belgium and Türkiye: Cultural Heritage Sensitivity and Sustainability. Sustainability, 17(23), 10849. https://doi.org/10.3390/su172310849
19. Lowe-Calverley, E., & Grieve, R. (2021). Do the metrics matter? An experimental investigation of Instagram influencer effects on mood and body dissatisfaction. Body image, 36, 1–4. https://doi.org/10.1016/j.bodyim.2020.10.003
20. Özkan, Ö. P., Ersü, D. Ö., & İrtürk, Ö. S. (2024). Examining the Relationship Between Social Media Addiction and Dietary Habits among Young Adults. Izmir Katip Çelebi University Faculty of Health Sciences Journal, 9(2), 225–233. https://doi.org/10.61399/ikcusbfd.1309136
21. Roorda, B. A., & Cassin, S. E. (2025). A Review of Food-Related Social Media and Its Relationship to Body Image and Disordered Eating. Nutrients, 17(2), 342. https://doi.org/10.3390/nu17020342
22. Röös, E. (2013). Analysis of the carbon footprint of food (No. 2013: 56).
23. Ruini, L. F., Ciati, R., Pratesi, C. A., Marino, M., Principato, L., & Vannuzzi, E. (2015). Working toward healthy and sustainable diets: The "Double Pyramid Model" developed by the Barilla Center for Food and Nutrition to raise awareness about the environmental and nutritional impact of foods. Frontiers in nutrition, 2, 9. https://doi.org/10.3389/fnut.2015.00009
24. Sob, C., Siegrist, M., & Hartmann, C. (2023). The Positive Eating Scale: Associations with eating behavior, food choice, and body mass index. Eating behaviors, 48, 101706. https://doi.org/10.1016/j.eatbeh.2023.101706
25. Solanki & Mahajan. (2023). Impact of Social Media on Dietary Choices. Int J Sci Res Sci & Technol. 10 (3) : 879–887. https://doi.org/10.32628/IJSRST
26. Stanszus, L. S., Frank, P., & Geiger, S. M. (2019). Healthy eating and sustainable nutrition through mindfulness? Mixed method results of a controlled intervention study. Appetite, 141, 104325. https://doi.org/10.1016/j.appet.2019.104325
27. Steptoe A, Pollard TM, Wardle J. Development of a measure of the motives underlying the selection of food: the food choice questionnaire. Appetite. 1995; 25(3): 267–284.
28. Takacs, B., Stegemann, J. A., Kalea, A. Z., & Borrion, A. (2022). Comparison of environmental impacts of individual meals-Does it really make a difference to choose plant-based meals instead of meat-based ones?. Journal of Cleaner Production, 379, 134782. https://doi.org/10.1016/j.jclepro.2022.134782

29. Temme, E. H., Bakker, H. M., Seves, S. M., Verkaik-Kloosterman, J., Dekkers, A. L., van Raaij, J. M., & Ocké, M. C. (2015). How may a shift towards a more sustainable food consumption pattern affect nutrient intakes of Dutch children?. Public Health Nutrition, 18(13), 2468–2478. https://doi.org/10.1017/S1368980015002426
30. van de Locht, K., Perrar, I., Paris, J. M. G., Schnermann, M. E., Oluwagbemigun, K., Alexy, U., & Nöthlings, U. (2024). Environmental sustainability of diets among children and adolescents in the German DONALD cohort study: age and time trends, and nutrient adequacy. The American Journal of Clinical Nutrition, 120(1), 92–101. https://doi.org/10.1016/j.ajcnut.2024.04.026
31. Vilkaite-Vaitone, N. (2024). From likes to sustainability: How social media influencers are changing the way we consume. Sustainability, 16(4), 1393. https://doi.org/10.3390/su16041393
32. World Health Organization. 2004. BMI classification. Available from: World Health Organization. BMI classification 2004. Available at https://www.who.int/data/gho/ data/themes/topics/topic-details/GHO/body-mass-index?introPage=intro_3.html.
33. World Health Organization. Physical status: the use and interpretation of anthropometry: report of a WHO Expert Committee. World Health Organ Tech Rep Ser. No. 854. Geneva: WHO; 1995.
34. Yavuz, K., Karahan, S., & Altıner, D. D. (2025). Healthy Choices, Conscious Consumption: A Review on Food Literacy. New Trends in Tourism II, 229.
35. Żakowska-Biemans, S., Pieniak, Z., Kostyra, E., & Gutkowska, K. (2019). Searching for a measure integrating sustainable and healthy eating behaviors. Nutrients, 11(1), 95. https://doi.org/10.3390/nu11010095.