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Fast-Food Consumption and Its Impact on Physical and Mental Health Among University Students: A Cross-Sectional Study

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ABSTRACT

The reasons why fast food is popular among university students are convenience, cost, and time. However, its frequent intake may lead to negative consequences regarding both the physical and psychological well-being of students. **Objectives:** To determine the associations between fast-food intake patterns and various health problems such as fatigue, insomnia, depression, anxiety, body weight, etc. **Methods:** A cross-sectional survey was conducted among 236 university students (60.3% female) from three universities in Lahore, Pakistan. Data were analyzed using chi-square tests, logistic regression, and descriptive statistics. **Results:** Of the 236 university students, over 97% consumed fast food at least once per week. Each category increase in the frequency of fast-food intake (from "never" to "daily") was significantly related to overweight/obesity and depressive symptoms, and post-meal fatigue after adjustment. There were strong associations between fatigue and sleep disturbances, as well as between fatigue and anxiety symptoms. Demographic adjustments did not remove this association between higher levels of fast-food intake and overweight/obesity. **Conclusions:** Fatigue, depression symptoms, sleep disturbances, and excess body weight are related to regular consumption of fast food among university students. There is an increasing need for nutrition education based at the university, and healthier foods available on campus

INTRODUCTION

The diets of university students have changed significantly, with fast food becoming an obvious choice of food [1, 2]. The main reason for this is that students have a hectic life that involves them with studies, part-time jobs, and social activities, which leaves them too little time to plan their meals or cook at home. There are many fast-food outlets near university campuses, and the growth of food delivery apps has diminished access to these meals, creating an increasing presence of energy-dense, nutrient-poor meals as a staple for university students around the world. In Portugal, around 80% of higher education students eat fast

food (more than once/day or twice/week) [3], and in Pakistani university canteens, ultra-processed foods make up a significant part of the calorie and sugar consumption of the students [2]. Fast food is characterized by high energy density, saturated fat, refined sugars and salt content, and low in dietary fiber, vitamins (A, C, D, B complex), and minerals (Ca, Mg, Fe) [1]. Even small increases in ultra-processed foods consumption were associated with increased risk of prediabetes and insulin resistance in a study of young adults [4]. University students who tend to eat takeaway and fast food have a risk



of comorbid depression and anxiety symptoms, whilst students who tend to eat fresh and minimally processed food have a significantly lower risk of depression, anxiety, and stress [5]. In a large sample of Chinese students, greater intake of takeaway food was positively correlated with comorbid depression and anxiety, and this risk was especially high among male students [6]. Consumption of fast food has also been shown to be positively associated with poor sleep quality; people with poor sleep quality were more likely to eat fast food, especially when experiencing daytime dysfunction due to the poor sleep quality [7]. This establishes a vicious cycle: unhealthy eating affecting sleep, and poor sleep influencing eating. Social and environmental factors are found to reinforce fast food dependency among students, and ease of preparation (59.9%), price (48.5%), and flavor (28.3 %) are found to be the most influential factors [8]. Peer influence is also significant; students influenced by peers are more likely to eat fast food than not [8]. Additionally, gender differences should be taken into account; boys seem to be more susceptible to psychological symptoms as a result of poor nutrition, whereas girls present unique emotional eating and weight concerns [9]. Although there is a growing body of literature that associates fast food consumption with negative physical and mental health outcomes, there are still important gaps in the literature, especially the interaction of multiple behavioral and psychological factors in university students in the South Asian context [1, 9].

Only a few studies have investigated the relationships between cravings, post-consumption guilt, sleep pattern changes, and perceived academic impact in the same sample of students. In turn, the external influences (peer pressure, promotion) and the internal influences (craving, emotion) on their consumption patterns have not been examined simultaneously. To address these gaps, this study aimed to assess the frequency and patterns of fast-food consumption among university students, to examine associations between fast food consumption and physical health outcomes (fatigue, weight status), and to explore links between fast food consumption and mental health indicators (stress, guilt, sleep disturbances). Also, to gauge how often university students eat fast food and what kind of eating habits they have, as well as to see if there were any links between it and physical health measures (fatigue, weight status), mental health measures (stress, guilt, sleep difficulties).

METHODS

A cross-sectional study was conducted among the undergraduate students of three universities in Lahore, Punjab, Pakistan (Punjab University, Combined Military

Hospital Lahore Medical College, and University of Engineering and Technology Lahore) from January to June 2025. Convenience sampling was used, and 236 students between 17 and 30 years old were recruited. In all, 236 eligible students were identified for complete data, although some did not respond, and questionnaires were incomplete. A convenience sampling method was used in selecting the universities in Lahore for the recruitment of the participants. The number of participants who were able to join from each institution was based on accessibility and willingness to participate instead of on proportional allocation based on student numbers. So, the number of participants in each university was not equal. The achieved sample size was 95.9% of the targeted sample size, which meant that there was only a slight loss of statistical power. This restriction should be borne in mind, but the results must be interpreted accordingly. However, the sample size was still adequate to identify statistically significant relationships for key study outcomes. The information was gathered through a structured self-administered questionnaire adapted from published studies in the area of fast-food intake and health among university students [5, 8]. Weight status was determined using self-reported height (in meters) and weight (in kilograms) provided by participants. Body Mass Index (BMI) was calculated as weight/height^2 . Participants were categorized according to WHO criteria: Underweight ($<18.5 \text{ kg/m}^2$), Normal ($18.5\text{--}24.9 \text{ kg/m}^2$), Overweight ($25.0\text{--}29.9 \text{ kg/m}^2$), and Obese ($\geq 30.0 \text{ kg/m}^2$). Self-reported anthropometry is subject to systematic bias; however, due to the logistical constraints of large-scale survey administration in university settings, objective measurements were not feasible. Self-reported questionnaire items were used to assess depression, anxiety, fatigue, and sleep changes. These were asked by the participants if they had experienced any of the symptoms, and responses were included in a binary (Yes/No) format for statistical analysis. There were no uniform diagnostic tools available, and the reported outcomes are based on participants' perceptions rather than clinically established conditions. The questionnaire consisted of demographic information, consumption frequency of fast food, type of fast food eaten, motivations for eating fast food, and self-reported physical and mental health outcomes. Selected items on behavioral and attitudinal aspects were rated by the participants on a 5-point Likert scale. All currently enrolled full-time undergraduate students aged 17–30 years, irrespective of their recent dietary history, were considered eligible for the study. This inclusive approach was adopted to capture the complete distribution of fast-food consumption patterns

(from never to daily) and to avoid selection bias that would artificially inflate the observed prevalence of consumption. Completed questionnaires were excluded if they were from students who were diagnosed as having an eating disorder or who did not complete the questionnaire. Data collection was approved by the relevant IRB before the data collection process.

Data were analyzed using R version 4.3.5. Participant characteristics and fast-food consumption patterns were summarized using descriptive data such as frequencies and percentages. Chi-square tests were used to evaluate the associations between categorical variables like frequency of fast-food intake, demographic characteristics, and health outcomes. Multivariable logistic regression models adjusted for pre-selected demographic covariates: age (categorized as 18–21, 22–25, >25 years), gender, and living arrangement (at home, hostel/dormitory, shared apartment). Notably, we did not adjust for physical activity levels, overall dietary patterns, socioeconomic status, or academic stress, which are recognized confounders in the diet–health literature. For all analyses, a p-value of less than 0.05 was considered statistically significant, and both two-tailed and one-tailed tests were used. In the logistic regression analysis, the consumption frequency of fast food was presented as an ordered variable to examine trends with increasing frequency of fast-food consumption. This method makes the assumption that the log odds of an outcome vary linearly within each separate consumption category.

RESULTS

The vast majority of students (over 97%) report consuming fast food at least occasionally, with weekly consumption being the most common pattern: 28.0% eat fast food once a week, 22.0% two to three times per week, and a notable 10.2% consume it daily. Only 2.5% never eat fast food. Regarding the types of fast food chosen, pizza is the most frequently selected item (41.9% of students), closely followed by fried chicken (33.1%), burgers and fries (30.9%), and instant noodles (30.5%). Sugary beverages are also consumed by more than one-fifth of students (21.6%). These preferences point to a diet dominated by energy-dense, highly palatable, and often nutrient-poor foods. The primary drivers of consumption are tasting preference (34.7%), socializing with friends (32.2%), and affordable price (31.4%), while convenience and time-saving play a relatively smaller but still relevant role (17.8%). Collectively, these data indicate that fast-food consumption is deeply embedded in students' eating habits, motivated by both hedonic (taste, social) and economic (affordability) factors, and largely centered on

high-calorie items that may contribute to adverse health outcomes when consumed frequently (Table 1).

Table 1: Descriptive Summary of Fast-Food Consumption Patterns Among University Students (n=236)

Parameters	Category	n (%)
Frequency of Consumption	Once A Week	66 (28.0%)
	2–3 Times A Month	65 (27.5%)
	2–3 Times A Week	52 (22.0%)
	Rarely	23 (9.8%)
	Daily	24 (10.2%)
	Never	6 (2.5%)
Most Consumed Fast-Food Types	Pizza	99 (41.9%)
	Fried Chicken	78 (33.1%)
	Burgers and Fries	73 (30.9%)
	Instant Noodles	72 (30.5%)
	Soft Drinks and Sugary Beverages	51 (21.6%)
Main Reasons for Consumption	Taste Preference	82 (34.7%)
	Socializing With Friends	76 (32.2%)
	Affordable Price	74 (31.4%)
	Convenience and Time-Saving	42 (17.8%)

Gender and weight status are significantly associated with fast-food frequency ($p < 0.05$), whereas living arrangement and long-term health issues are not. Depression symptoms after fast food are significantly more common among higher-frequency consumers, and fatigue after fast food strongly correlates with sleep disturbances. The link between belief in the diet–mental health connection and actual depression is marginally non-significant, suggesting a possible trend requiring further investigation (Table 2).

Table 2: Chi-Square Tests of Associations Between Fast-Food Frequency, Health Indicators, and Demographic Factors

Associations	χ^2	df	p-value
Fast Food Frequency × Gender	68.43	3	<0.01
Fast Food Frequency × Living Arrangement	20.74	6	0.14
Fast Food Frequency × Weight Status	26.61	9	0.03
Fast Food Frequency × Long-Term Health Issue	4.60	3	0.46
Acidity × Frequency Group	1.03	3	0.59
Anxiety × Frequency Group	1.94	3	0.38
Depression × Frequency Group	6.92	3	0.03
Belief Diet Affects Mental Health × Depression	7.29	4	0.06
Sleep Changes × Fatigue After Fast Food	34.50	4	<0.01

*df = degrees of freedom

Gender and living arrangement were not independently associated with self-reported weight gain after adjustment (AOR=1.077 per one category increase; 95% CI: 0.843–1.376; $p=0.55$; and AOR=1.055 per one category increase; 95% CI: 0.85–1.30; $p=0.86$, respectively) (Table 3).

Table 3: Logistic Regression Predicting Self-Reported Weight Gain After Fast Food

Predictors	Estimate	Std. Error	z	p-value	Odds Ratio	CI
Intercept	-1.267	0.421	-3.006	0.03	0.282	—
Fast-Food Frequency (Ordinal)	0.074	0.125	0.597	0.51	1.077	(0.843 – 1.376)
Gender (Male vs Female)	0.229	0.306	0.747	0.45	1.257	(0.689 – 2.294)
Living Arrangement (Hostel vs At Home)	-0.123	0.387	-0.317	0.72	0.885	(0.414 – 1.888)

After the consumption of fast foods, neither underweight (AOR=1.05, 95% CI: 0.54–2.04) nor overweight (AOR=1.36, 95% CI: 0.80–2.31) weight status was associated with anxiety symptoms, and neither underweight nor obese status was associated with anxiety symptoms (AOR=1.68, 95% CI: 0.75–3.76). Fatigue after fast food emerged as a statistically significant independent predictor of anxiety symptoms (AOR = 1.42, 95% CI: 1.04–1.94; $p = 0.02$). Fast-food frequency ($p = 0.27$), guilt frequency ($p = 0.16$), and all weight status categories (underweight, overweight, and obese; $p = 0.88$, $p = 0.25$, and $p = 0.20$, respectively) were not significantly associated with anxiety symptoms in this model. Additionally, for logistic regression analysis with overweight/obesity (vs normal weight) as the binary outcome, the association of higher frequency of fast-food consumption and overweight/obesity remained significant (AOR=1.23 per one category increase, 95% CI: 1.03–1.47; $p = 0.02$). Gender was not significantly associated with the outcome (AOR=0.96, 95% CI: 0.41–2.28; $p = 0.94$), and living arrangement was also not significant (AOR = 1.14, 95% CI: 0.56–2.33; $p = 0.72$). Age above 25 years had a borderline association (AOR=2.39, 95% CI: 0.88–6.49; $p = 0.08$) (Table 4).

Table 4: Logistic Regression Model for Anxiety Symptoms After Fast-Food Consumption and Logistic Regression Predicting Overweight/Obesity

Predictors	β (SE)	Wald χ^2	p-value	Adjusted Odds Ratio	95% CI
Fast-food frequency	0.12 (0.11)	1.19	0.27	1.13	(0.91 – 1.40)
Fatigue after fast food	0.35 (0.16)	4.79	0.02	1.42	(1.04 – 1.94)
Guilt frequency	0.18 (0.13)	1.92	0.16	1.20	(0.93 – 1.55)
Weight Status					
Underweight	0.05 (0.34)	0.02	0.88	1.05	(0.54 – 2.04)
Overweight	0.31 (0.27)	1.32	0.25	1.36	(0.80 – 2.31)
Obese	0.52 (0.41)	1.61	0.20	1.68	(0.75 – 3.76)
Constant	-1.85 (0.44)	17.68	<0.01	0.16	—
Logistic Regression Predicting Overweight/Obesity					
Fast food frequency	0.21 (0.09)	5.44	0.02	1.23	(1.03 – 1.47)
Gender	0.35 (0.28)	1.56	0.21	1.42	(0.82 – 2.46)
Age					
18–21	0.18 (0.42)	0.18	0.66	1.20	(0.53 – 2.72)
22–25	0.52 (0.44)	1.40	0.23	1.68	(0.71 – 3.98)
Above 25	0.87 (0.51)	2.91	0.08	2.39	(0.88 – 6.49)

Living Arrangement (Ref: At Home)					
Hostel/Dormitory	-0.22 (0.31)	0.50	0.47	0.80	(0.44 – 1.47)
Shared apartment	0.08 (0.34)	0.06	0.81	1.08	(0.56 – 2.11)
Constant	-1.85 (0.52)	12.66	<0.01	0.16	—

The chi-square test revealed a statistically significant association between fast food consumption frequency and post-consumption fatigue ($\chi^2 = 48.23$, $p < 0.01$). Students who consumed fast food more frequently, particularly those eating it daily or 2–3 times per week, were substantially more likely to report feeling tired "sometimes" or "always" after eating compared to infrequent consumers. Notably, 25.0% of daily consumers reported "always" feeling fatigued, whereas no never-consumers reported this level of fatigue. These findings suggest that higher fast-food intake is linked to greater acute fatigue symptoms (Table 5).

Table 5: Association Between Fast Food Frequency and Fatigue After Consumption

Fast Food Frequency	Fatigue After Fast Food, n (%)				χ^2 (p-value)
	Never	Rarely	Sometimes	Always	
Never	4 (66.7%)	2 (33.3%)	0 (0%)	0 (0%)	—
Rarely	10 (43.5%)	8 (34.8%)	4 (17.4%)	1 (4.3%)	—
2–3 Times/Month	18 (27.7%)	25 (38.5%)	18 (27.7%)	4 (6.2%)	—
Once A Week	12 (18.2%)	28 (42.4%)	20 (30.3%)	6 (9.1%)	—
2–3 Times/Week	6 (11.5%)	18 (34.6%)	20 (38.5%)	8 (15.4%)	—
Daily	2 (8.3%)	6 (25.0%)	10 (41.7%)	6 (25.0%)	—
Total	52 (22.0%)	87 (36.9%)	72 (30.5%)	25 (10.6%)	$\chi^2 = 48.23$, $p < 0.01$

DISCUSSION

This cross-sectional study offers valuable insights into the relationships between fast food consumption patterns and health outcomes among university students of Lahore, Pakistan. The results indicate that there is almost universal consumption of fast food among this population (more than 97%), with this being done weekly (Table 1). These data are in line with previously reported high prevalence rates among students attending higher education in South Asian and Western countries [10, 11]. The easy availability of ready-to-eat options around university campuses and the number of food delivery apps have made it seem like eating fast food often is a part of university life, rather than an indulgence. The taste preference (34.7%), socializing with friends (32.2%), and affordable price (31.4%) are the major factors influencing the consumption identified in this study, which are similar to the factors identified in Portugal [12] and Malaysia [13], where taste, convenience, and peer influence emerged as the most dominant factors. The high social aspect of fast-food consumption that was found here is remarkable, and even if it is not only nutrition that makes fast food consumption a social bonding mechanism, it is this aspect that is dominant here. This insight is of importance to the design of interventions as it suggests

that peer-based nutrition education interventions or community-based healthy eating challenges could be more successful than individual-based approaches [14]. The strong association found in this study between frequency of fast-food consumption and overweight/obesity status (AOR=1.23, $p=0.02$) remains when the data are adjusted for gender, age, and living arrangement. This dose-response relationship confirms systematic review evidence of a relationship between ultra-processed food consumption and adiposity indicators in young adults [15]. A recent study conducted among university students in China found that eating and ordering takeout food was significantly associated with co-occurring depression and anxiety, especially among male students [16]. This relationship could be either biological or psychosocial. On a biological level, high glycemic, low nutrient foods over time can facilitate neuroinflammation, dysregulated gut-brain axis, and decreased monoamine neurotransmitter synthesis [17]. The dose-response relationship has important ramifications for academic performance; fatigue will affect concentration, memory consolidation, and cognitive endurance. Moreover, there was a strong association between sleep changes and fatigue from eating fast food ($\chi^2=34.50$, $p<0.01$), implying that a cyclical relationship exists: eating fast food could worsen sleep quality, which would in turn affect dietary self-regulation and lead to greater energy-dense food cravings [18]. There was a non-significant trend for guilt frequency ($p=0.16$) in accordance with literature indicating that post-consumption guilt is more related to disordered eating patterns than to generalized anxiety [19]. The high prevalence of fast-food consumption observed in this study is consistent with findings from Pakistan and neighboring South Asian countries, where urbanization, increased availability of food delivery services, and busy academic schedules have contributed to unhealthy dietary practices among young adults. Similar patterns have been reported among university students in Karachi and Lahore, where taste preference, convenience, and social influence were identified as major determinants of fast-food consumption [20, 21]. Being overweight/obese and frequent fast-food consumption were biologically plausible due to the high energy density and saturated fat, refined carbohydrate, and sodium content of fast food. These links have also been seen in systematic reviews and in longitudinal studies and have been found to be linked to weight gain and metabolic disorders in young adults [15, 22].

The limitations of the study are that it is a cross-sectional study and thus cannot draw any causal inferences; the data were self-reported, which could lead to recall and reporting bias; and it involved only three universities in Lahore, which again limits generalizability. Also, major confounding

variables like physical activity, overall diet, and socioeconomic status were not fully investigated. Longitudinal or multicenter studies with larger and more heterogeneous populations and with objective health assessments would be useful in clarifying causal pathways in future studies. Consequently, the findings may not be fully representative of all university students, and caution should be exercised when extrapolating the results to broader populations. Future studies should employ probability-based sampling methods and include a more geographically diverse sample to enhance generalizability.

CONCLUSIONS

In this conclusion, it is necessary to note that university students are highly prone to consumption of fast food, and the latter is significantly correlated with obesity/overweight, depressive symptoms, fatigue, and insomnia. Furthermore, the frequency of consumption of fast food is an independent predictor of obesity/overweight, controlling for demographic characteristics. These results stress the necessity of nutrition education and health promotion programs for university students.

Authors' Contribution

Conceptualization: LS

Methodology: SK

Formal analysis: MNA

Writing and Drafting: RI

Review and Editing: LS, RI, MNA, SK

All authors approved the final manuscript and take responsibility for the integrity of the work

Conflicts of Interest

All the authors declare no conflict of interest.

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