

ORIGINAL ARTICLE

RELATIONSHIP OF EATING DOMAINS WITH ANXIETY AND PHYSICAL ACTIVITY AMONG UNIVERSITY STUDENTS OF LAHORE

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Background: The transition to higher education can significantly impact students' physical and mental health. Three dimensions of an eating behaviour: self-restraint, uncontrolled (binge) eating, and emotional eating are measured via Three-Factor Eating questionnaire. The objective of study was to explore the relationship of eating domains with anxiety and physical activity among university students.

Methods: This cross-sectional study was conducted from Apr to Oct 2024 in universities of Lahore. The study populace comprised of adults aged 18–24 years. Random sampling was done to select participants through computer generated process. Inclusion criteria were students aged 18–24 years, registered currently in university, having no diagnosed mental illnesses. Participants with diagnosed medicinal or psychiatric conditions were excluded. Data collection tools were TFEQ, IPAQ and GAD validated questionnaires and Anthropometric Parameters. IBM SPSS-21 was used for data analysis, and $p \leq 0.05$ was taken as statistically significant. **Results:** Out of 385 participants, females were 192 (49.87), while males were 193 (50.13%). The association between BMI and IPAQ status was not significant ($p=0.554$). An independent sample *t*-test revealed that there was no statistical significant association of cognitive restraint scores and uncontrolled eating scores with IPAQ status, where *p* were 0.875 and 0.403 respectively. **Conclusion:** Three-Factor Eating domains had no statistical significant relationship with physical activity and anxiety among university students despite the fact that degree of physical activity in this population has little bearing on compulsive eating behaviours.

Keywords: Anxiety, IPAQ, Students, TFEQ-R18

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INTRODUCTION

Obesity is body adiposity or an excess body fat.¹ Body mass index (BMI) has served as an extremely useful estimate of individual's weight relative to height since many years.² It is calculated as person's body weight (Kg) divided by square of height (m^2).³ It is a commonly understood measure and easily calculated among researchers, general public, and clinicians, having a high specificity and low sensitivity.⁴

Anxiety disorders affect around 34% adults during their life-time and are related to significant impairment and distress, whereas prevalence for generalized anxiety disorder is 6.2%.⁵ A 7-item Generalized Anxiety Disorder scale (GAD-7) is used as brief screening tool for detection of anxiety.⁶ Better understanding of psychology of eating, including emotional, behavioural and cognitive aspects require more attention due to surging prevalence of obesity globally.⁷ Self-assessment questionnaires are of utmost importance for an evaluation of the eating behaviours. Presently, there are numerous questionnaires used widely for studying eating behaviour, amongst which Dutch Eating Behaviour Questionnaire, Three-Factor Eating Questionnaire (TFEQ), and Restraint Scale, are

most prominently cited.⁸ Usually eating disorders start in early years of teens, their estimated prevalence among college students was eleven-seventeen percent for females and four percent for males. Eating behaviour is broadly recognized as a result of internalized multi-dimensional constructs that encompass emotional, behavioural, and cognitive elements.⁹

In order to evaluate physical activity among the community, an international Physical Activity Questionnaire (IPAQ) was created. The shortened form of IPAQ has been evaluated extensively and is currently being utilized in several international investigations.¹⁰ Physical activity was categorized using an IPAQ scoring protocol. In 1998, WHO developed international Physical Activity Questionnaire–short form (IPAQ-SF), which is a common measurement tool for physical activity with seven questions.¹¹

The transition to higher education can significantly impact students' physical and mental health. Given the limited research in Pakistan on the relationship between generalized anxiety disorder (GAD) & TFEQ with physical activity levels (as measured by IPAQ) among young adults, a study investigating this association is warranted to inform interventions and support services for this population.

The objective of this study was to explore the relationship of eating domains with anxiety and physical activity among university students of Lahore.

METHODOLOGY

This cross-sectional study was conducted from April to October 2024 in University of Veterinary and Animal Sciences, and University of Engineering and Technology, Lahore. The study populace comprised of adults aged 18–24 years. Random sampling was done to select participants through computer generated process.

Inclusion criteria were students aged 18–24 years, registered currently in university, having no diagnosed mental illnesses. Students with diagnosed medicinal or psychiatric conditions were excluded.

Data collection tools were questionnaires and anthropometric parameters were weight (Kg), height (m), and BMI (Kg/m²). Sample size was calculated as 385 using the formula: $n = (Z\alpha/2)^2 [P(1-P)]/d^2$, where n is sample size, P is proportion (50%), $(Z\alpha/2) = 1.96$ and Z is confidence level (95%).

To gather data, our study employed three established validated questionnaires, each targeting different aspects of this research:

- Three Factor Eating Questionnaire-R18 (TFEQ-R18): It is extensively used and recognized tool offering intuitions into how anxiety might influence eating patterns, together with responses to stress and emotional triggers. This questionnaire evaluates 03 dimensions of an eating behaviour: self-restraint, uncontrolled (binge) eating, and emotional eating.^{7,12}
- International Physical Activity Questionnaire (IPAQ): It helps in evaluating an amount of the physical activity performed by persons on weekly basis & provides a complete view of activity patterns. It designed to measure physical activity level across various intensities, including low, moderate, and vigorous activities.^{10,13}
- Generalized Anxiety Disorder-7 (GAD-7): It is made-up of seven items and is relatively accurate screening tool for identifying anxiety disorders and symptoms with great validity and reliability.⁶

IBM SPSS-21 was used for data analysis. Descriptive statistics were presented as frequencies, means and percentages. Chi-square test, independent sample t -test and one-way ANOVA were used to check associations of anxiety scores with physical activity patterns and eating behaviours, and $p < 0.05$ was taken as statistically significant.

RESULTS

Out of 385 participants, females were 192 (49.87%), while men were 193 (50.13%). Almost half (48.05%) of the students had normal BMI, 19 (4.94%) were underweight, 40.78% were overweight whereas (6.23%) belonged to obese category.

Severity of GAD symptoms was used to categorize these participants. Majority (264, 68.57%) individuals were in ‘Minimal’ anxiety category. One-fifth (20.78%), experienced ‘Mild’ anxiety, 31 (8.05%) were under ‘Moderate’ anxiety category, and 2.6% were in category of ‘Severe’ anxiety.

IPAQ status is categorized into two levels: moderate and low physical activity. The p -value for the association between gender and IPAQ status was 0.698, suggesting that there was no statistically significant association between gender and IPAQ status in this population. The table also examines the association between BMI categories and IPAQ status. Notably, in the obese category, none of the participants (0%) are classified as having moderate physical activity, while all 24 (100%) are categorized as having low physical activity levels. The p -value for the association between BMI and IPAQ status is 0.554, indicating that there is no statistically significant association between BMI and IPAQ status. (Table-1).

In particular, the mean scores for those with mild GAD were 1.87 ± 0.38 , for those with moderate GAD they were 1.85 ± 0.38 , for those with moderate GAD they were 2.00 ± 0.51 , and for those with severe GAD they were 1.93 ± 0.47 . One-way ANOVA was applied and $p = 0.882$ indicates that there is no statistically significant difference in cognitive restraint scores between the various GAD statuses, suggesting that the degree of cognitive restraint in these young adults’ eating behaviours is not significantly influenced by the severity of their GAD. Those with more severe GAD had higher scores on the Uncontrolled Eating Score, which gauges the propensity to overeat in response to outside cues. These variations are not statistically significant ($p = 0.483$). This shows that although there is a discernible trend of higher uncontrolled eating scores as GAD severity increases, the differences are not great enough to support a meaningful association between uncontrolled eating behaviour and GAD status. The degree to which people eat in reaction to their emotions is measured by the Emotional Eating Score, which varies amongst GAD statuses. The data indicates that there is no statistically significant difference in emotional eating scores between the various GAD categories ($p = 0.161$). (Table-2).

An independent sample t -test revealed that there was no statistical significant association of cognitive restraint scores and uncontrolled eating scores with IPAQ status, ($p = 0.875$ and 0.403 respectively). The degree to which eating is a reaction to emotions, measured by the Emotional Eating Score, was less in people with moderate physical activity (1.66 ± 0.5) than in people with low physical activity (1.97 ± 0.59), the difference is not statistically significant despite this variation ($p = 0.161$). This suggests that although there may be a tendency for people with lower levels of

physical activity to eat more emotionally, there is not a significant enough correlation between physical activity and emotional eating to warrant statistical analysis. (Table-3).

Table-1: Association of gender and BMI with international physical activity status in young adults

	IPAQ Status [n (%)]		p
	Moderate	Low	
Gender			
Male	3 (1.55)	190 (98.45)	0.698
Female	4 (2.08)	188 (97.92)	
BMI			
Underweight	1 (5.26)	18 (94.74)	0.554
Normal	4 (2.16)	181 (97.84)	
Overweight	2 (1.27)	155 (98.73)	
Obese	0 (0)	24 (100)	

Table-2: Relationship of 3-factor eating scores and anxiety status (GAD) among young adults studying in different universities of Lahore (Mean±SD)

TFEQ Scores	GAD Status				p
	Minimal	Mild	Moderate	Severe	
Cognitive Restraint Score	1.87±0.38	1.85±0.38	2±0.51	1.93±0.47	0.882
Uncontrolled Eating Score	1.94±0.34	2.14±0.46	2.4±0.45	2.04±0.54	0.483
Emotional Eating Score	1.91±0.51	2.08±0.7	2.19±0.69	2.06±1	0.161

One-way ANOVA applied

Table-3: Relationship of three-factor eating scores and international physical activity status (IPAQ) among young adults studying in different universities of Lahore (Mean±SD)

TFEQ	IPAQ Status		p
	Moderate	Low	
Cognitive Restraint Score	1.9±0.36	1.88±0.4	0.875
Uncontrolled Eating Score	2.13±0.31	2.02±0.4	0.403
Emotional Eating Score	1.66±0.5	1.97±0.59	0.161

Independent sample t-test applied

DISCUSSION

Physical activity is defined by WHO as ‘any bodily movement produced by the skeletal muscles which needs energy expenditure’, and it is ‘a substantial measure for improving health (both mental and physical)’.¹⁴

Globally depression and anxiety are solemn disabling conditions, correlating mental health illnesses with higher percentage of suicidal risks.^{15,16} Addressing the mental health matters of college students is essential as it’s a latest concern amongst community and programmatic efforts to help students and promote intervention/prevention strategies.^{17,18}

There was no statistically significant association between gender and IPAQ status in this population. This is contrary to another finding¹⁹ where, physical activity levels exhibited a significant relationship with a gender ($p < 0.001$). In our study there was no statistically significant association between BMI

and IPAQ status. This result implies that the BMI category does not significantly influence whether an individual is likely to engage in moderate or low physical activity within this group of young adults. This is contrary to another study¹⁹. Whereas, this is same as other research²⁰ where there was no significant correlation between BMI and physical activity.

Among children and adolescents, sedentary behaviour is vital health issue and is amplified with age.²¹ University students frequently experience a sitting time of more than 9 hours daily, which may trigger the onset of obesity. During adolescence, there is a notable decline in the amount of physical activity.^{19,22} Socio-economic status shows a crucial part in determining health consequences, including physical as well as psychological health.²³⁻²⁵ When it comes to treatment, many individuals in low income countries face significant obstacles to access treatment owing to financial constraints.^{26,27}

In this study, there was no statistically significant difference in cognitive restraint scores between various GAD statuses, suggesting that the degree of cognitive restraint in these young adults’ eating behaviours is not significantly influenced by the severity of their GAD. This is not in line with another research²⁸. The emotional component of eating is not substantially correlated with the severity of GAD in this population, despite the fact that there is a slight increase in emotional eating scores with higher GAD severity. This is not in accordance to another research²⁸.

Emotional cues for instance loneliness, stress, and sadness have been reported previously as robust triggers for an over-eating, particularly in populaces with restricted emotional regulation strategies.²⁹ In the current study, there was no statistical significant association of cognitive restraint scores and uncontrolled eating scores with IPAQ status. This suggests that these young adults’ degree of cognitive restraint in eating is not significantly influenced by their level of physical activity. This implies that the degree of physical activity in this population has little bearing on compulsive eating behaviours as well. This is in accordance to another research³⁰ where Three-Factor Eating domains showed insignificant relationship with physical activity levels.

LIMITATIONS

Short duration and small sample size were the main limitations of this study.

CONCLUSION

Three-Factor Eating domains had no statistical significant relationship with physical activity and anxiety among university students, despite the fact that degree of physical activity in this population has little bearing on compulsive eating behaviours.

REFERENCES

1. Bray GA, Sumińska M. From hippocrates to the obesity society: a brief history. In: Bray GA, Bouchard C, (Eds). Handbook of Obesity, Epidemiology, Etiology, and Physiopathology, 5th ed; Two-Volume Set. Boca Raton: CRC Press; 2024. Available from: <https://www.taylorfrancis.com/chapters/edit/10.1201/9781003437734-2/hippocrates-obesity-society-george-bray-marta-sumi%C5%84ska>
2. Bray GA. Beyond BMI. *Nutrients* 2023;15(10):2254.
3. Eknoyan G. Adolphe Quetelet (1796–1874)—the average man and indices of obesity. *Nephrol Dial Transplant* 2008;23(1):47–51.
4. Okorodudu DO, Jumean MF, Montori VM, Romero-Corral A, Somers VK, Erwin PJ, *et al*. Diagnostic performance of body mass index to identify obesity as defined by body adiposity: a systematic review and meta-analysis. *Int J Obes* 2010;34(5):791–9.
5. Szuhany KL, Simon NM. Anxiety disorders: a review. *JAMA* 2022;328(24):2431–45.
6. Gong Y, Zhou H, Zhang Y, Zhu X, Wang X, Shen B, *et al*. Validation of the 7-item generalized anxiety disorder scale (GAD-7) as a screening tool for anxiety among pregnant Chinese women. *J Affect Disord* 2021;282:98–103.
7. Wrzecionkowska D, Rivera Aragón S. Three-factor eating questionnaire-R18 (TFEQ-R18) Spanish version: factor structure analysis among normal weight and overweight adults. *Acta Investig Psicol AIP* 2021;11(1):84–94.
8. Vázquez-Velázquez V, Velázquez-Jurado H, Stephano-Zúñiga S, Méndez-Hernández C, Salinas-Rivera E. Psychometric properties of the Three-Factor Eating Questionnaire-R18 (TFEQ-R18) in Mexican patients with obesity. *Rev Mex Trastor Aliment* 2022;12(2):146–55.
9. Harter M, Adam SH, Messner EM, Baumeister H, Cuijpers P, Bruffaerts R, *et al*. Prevention of eating disorders at universities: A systematic review and meta-analysis. *Int J Eat Disord* 2020;53(6):813–33.
10. Dharmansyah D, Budiana D. Indonesian adaptation of the international physical activity questionnaire (IPAQ): Psychometric properties. *J Pendidik Keperawatan Indones* 2021;7(2):159–63.
11. Sodenno, M, Aung, M.N, Yuasa, M, Moolphate, S, Klinbuayaem, V, Srihamsao, A, *et al*. Association between physical activity and type 2 diabetes using the international physical activity questionnaires: a case-control study at a health promoting hospital in Chiang Mai, Northern Thailand. *Diabetes Metab Syndr and Obes* 2022;15:3655–67.
12. Alhebshi S, Hilary S, Safi SKH, Ali HI, Cheikh Ismail L, Al Dhaheri A, *et al*. Validity and reliability of the Arabic version of the Three-Factor Eating Questionnaire-R18. *Heliyon* 2023;9(7):e17623.
13. Blasco-Peris C, Climent-Paya V, Vetrovsky T, García-Álvarez MI, Manresa-Rocamora A, Beltrán-Carrillo VJ, *et al*. International Physical Activity Questionnaire Short Form and accelerometer-assessed physical activity: concurrent validity using six cut-points in HF patients. *ESC Heart Fail* 2024;11(1):126–35.
14. Schoufour JD, Tieland M, Barazzoni R, Ben Allouch S, van der Bie J, Boirie Y, *et al*. The relevance of diet, physical activity, exercise, and persuasive technology in the prevention and treatment of sarcopenic obesity in older adults. *Front Nutr* 2021;8:661449.
15. Baqi A, Zia Q, Shaikh SP, Shoaib M, Javaid MM, Malik MS. Determinants of anxiety in amputees owed to traumatic & non-traumatic causes in Quetta. *Ann Pak Inst Med Sci* 2022;18(3):175–80.
16. Windarwati HD, Lestari R, Wicaksono SA, Kusumawati MW, Ati NA, Ilmy SK, *et al*. Relationship between stress, anxiety, and depression with suicidal ideation in adolescents. *J Ners* 2022;17(1):36–41.
17. Cadigan JM, Duckworth JC, Lee CM. Physical and mental health issues facing community college students. *J Am Coll Health* 2022;70(3):891–7.
18. Lipson SK, Phillips MV, Winkvist N, Eisenberg D, Lattie EG. Mental health conditions among community college students: A national study of prevalence and use of treatment services. *Psychiatr Serv* 2021;72(10):1126–33.
19. Hoseini M, Bardoon S, Bakhtiari A, Adib-Rad H, Omidvar S. Structural model of the relationship between physical activity and students' quality of life: Mediating role of body mass index and moderating role of gender. *PLoS One* 2022;17(8):e0273493.
20. Kutty MN, Ru TY, Chiang VH, Zhi YW. Association of physical activity and body mass index among university students: A cross-sectional study. *Sch J Arts Humanit Soc Sci* 2015;3(1):195–202.
21. Mielgo-Ayuso J, Aparicio-Ugarriza R, Castillo A, Ruiz E, Avila JM, Aranceta-Bartrina J, *et al*. Sedentary behavior among Spanish children and adolescents: findings from the ANIBES study. *BMC Public Health* 2017;17(1):94.
22. Castro O, Bennie J, Vergeer I, Bosselut G, Biddle SJ. How sedentary are university students? A systematic review and meta-analysis. *Prev Sci* 2020;21(3):332–43.
23. Javaid MM, Tariq MA, Sajid M, Uraneb S, Zia Q, Umer MF, *et al*. Impact of socioeconomic status and duration of HIV/AIDS on scarcity of vitamin-D among HIV infected patients. *Pak J Public Health* 2023;13(2):84–7.
24. Mansoor A, Mansoor E, Sana A, Javaid MM, Hussain K, Sarfraz J. Vaccination status of Hepatitis-B among dental patients visiting a public health sector of Islamabad. *Ann Pak Inst Med Sci* 2023;19(3):356–60.
25. Mansoor A, Mansoor E, Sana A, Javaid MM, Khan AS, Hussain K. Physiological and socio-economic satisfaction level of patients for acrylic and cast alloy dentures. *Pak J Physiol* 2023;19(4):6–10.
26. Javaid MM, Tahir A, Shaikh SP, Qadeer AA, Mansoor A, Sattar M, *et al*. Assessment of parents satisfaction level regarding health care services provided to their malnourished Thalassemic major children. *J Haematol Stem Cell Res* 2025;5(1):93–6.
27. Javaid MM, Ahmad I, Mansoor E, Ali SI, Bairam S, Umair M, *et al*. Socioeconomic status: A lethal weapon in deteriorating the satisfaction level attributed to thalassemia management in Pakistan. *Ann Pak Inst Med Sci* 2024;20(4):795–9.
28. Witaszek T, Babicki M, Brytek-Matera A, Mastalerz-Migas A, Kujawa K, Kłoda K. Maladaptive eating behaviours, generalised anxiety disorder and depression severity: a comparative study between adult women with overweight, obesity, and normal body mass index range. *Nutrients* 2023;16(1):80.
29. Agha MA, Noreen K, Javaid MM, Agha MH. Mental health and eating patterns: Relationship between body mass index, generalised anxiety disorder and three-factor eating scores among university students in Lahore. *J Rawalpindi Med Coll* 2025;29(3):465–70.
30. Tey WY, Loo RY, Tsai MC, Say YH, Ng AK, Shin TS, *et al*. Physical activity, eating behavior, and body image perception among university students. *Discov Soc Sci Health* 2025;5(1):17.

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MAA: Wrote discussion

SIA: Wrote methodology

SB: Data analysis and results

MY: Data collection

SPS: Drafting of script

AM: Wrote discussion

MMJA: Data analysis

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