



Prevalence, Association and Differences Between Ultra-Processed Food Consumption and Emotional Eating Among Male Varsity Badminton Players and Non-Athlete University Students

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ARTICLE INFO

Article History:

Received: September 15, 2024

Revised: November 13, 2024

Accepted: November 15, 2024

Available Online: November 16, 2024

Keywords:

UPF (Ultra-Processed Food)

Male Badminton Athletes

Non-Athletes

University Students

Emotional Eating

Funding:

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

ABSTRACT

This research was aimed at exploring the prevalence, association and differences between Ultra-Processed Food (UPF) consumption and emotional eating among male varsity badminton athletes and non-athlete university students. To conduct this study, a sample of 112 male students was drawn from eight universities from a major city in Pakistan. The sample included 56 varsity badminton athletes ($M = 21.34$, $SD = 1.81$) and 56 non-athlete students ($M = 21.79$, $SD = 1.42$). The tool to gather data involved a demographic questionnaire along with Highly Processed Food Consumption Questionnaire and the Emotional Eating Questionnaire. The SPSS version 27 was applied for analysis and investigation of data (IBM Corp, 2020). Results showed that male varsity badminton players reported low prevalence of both UPF consumption and emotional eating as compared to non-athlete university students. Additionally, it was also observed that there was a significant positive association between UPF consumption and emotional eating among both groups. Lastly, male varsity badminton players reported low UPF consumption as compared to non-athlete university students. However, no significant mean differences in emotional eating scores were reported among both groups. These findings highlight the significance of participating in individual sports particularly badminton to counter emotional eating and reduce the consumption of UPFs among varsity students.

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1. Introduction

Due to continuous increase in the academic workload and psychological stress, it has been observed that emotional eating has become an essential component of recent life of early adults (Dalton, 2024). Emotional eating can be described as the capacity of an individual to consume food when he is driven by negative emotions like stress and nervousness (Fraysn & Knäuper, 2018). This type of intake of food is most probably related to an individual's mental state rather than his physical hunger. Furthermore, it often contains the intake of sugary and fatty foodstuffs that contains high calories (Dubois et al., 2022). Emotional eating has also been suggested to become an improper response for managing stress and negative reactions which may further lead to harmful eating patterns (Caso et al., 2020). However, the mechanism of brain behind this emotional eating is complex as it may include the interaction of hormones like cortisol and the brain's reward system (Sato et al., 2023). It has been suggested that when an individual experiences stress, their body discharges cortisol (LaFata et al., 2024). This release of cortisol might lead to the increase in their cravings of food that may ultimately lead them to consumption of ultra-processed foods (UPFs) (Lopes Cortes et al., 2021). UPFs are mostly referred as

unhygienic foods because of the reason that they are passed through several steps of processing (Marino et al., 2021). To improve the shelf life and taste of these UPFs, some ingredients like preservatives and artificial sweeteners are added in them which may be harmful for human health (Juul et al., 2022).

Furthermore, it has been observed that the consumption of UPFs and emotional eating is mainly high among early adult university students (Lopes Cortes et al., 2021). Due to high competition levels and academic workload, university students are often observed to report increased levels of stress and nervousness (Pagliai et al., 2021). This might then activate the process of emotional eating activities among university students, thus leading them to the consumption of UPFs (Fondevila-Gascón et al., 2022; Kabasakal Cetin, 2023). According to one study, emotional eating is more frequently associated with undergraduate students of universities, while the occurrence of emotional consumption among university students is around 8.9 to 56% (Sze et al., 2021). Similarly, it has also been suggested that about 51.3% of calories consumed by early adults come from ultra-processed foodstuffs (Bielemann et al., 2015). The commonness is especially concerning given that early adulthood is a serious period for inaugurating long-term eating habits, and the unnecessary consumption of UPFs may have long-lasting consequences on their physical and mental health (Mesas et al., 2022). Furthermore, the easy availability of UPFs in universities located in urban areas, particularly Pakistan, makes them a common dietary choice, possibly influencing students' mental and emotional well-being (Ahmed et al., 2024; Ramon-Arbues et al., 2021). However, sports participation, particularly in individual sports, might turn out to be a productive measure against emotional eating and UPF consumption (Chen et al., 2020).

This is because participating in individual team sports has been suggested to promote self-discipline and enhance regulation of emotions, both of which can help reduce emotional eating and the consumption of UPFs (Kuzhelnyi et al., 2024). Badminton, in particular, is one such individual sport that has previously been associated with improved physical health and mental well-being (Cabello-Manrique et al., 2022). Furthermore, continuous engagement in badminton sport requires significant attention and focus that might aid in distracting all emotional triggers leading to a healthy lifestyle (Chen et al., 2022). Lastly the study solely focused on male varsity badminton players as both emotional eating and UPF consumption have been highly researched on female athletes thus leaving a significant research gap. Hence, this study was comprised of three primary aims which are as follows: a) To measure the prevalence of emotional eating and consumption of UPFs among male varsity badminton players and non-athlete students. b) To assess the association between emotional eating and UPF consumption among both male varsity badminton players and non-athlete students. c) To assess the differences in emotional eating and UPF consumption among male varsity badminton players and non-athlete students. The findings of this study might aid in tailoring sports-based wellness programs to improve physical and emotional well-being of university students. It might also help in developing interferences that promote healthier eating habits and emotional managing policies among early adult male varsity students (Ahmed, Azhar, & Mohammad; Dler M Ahmed, Z Azhar, & Aram J Mohammad, 2024; Dler Mousa Ahmed, Zubir Azhar, & Aram Jawhar Mohammad, 2024; Mohammad, 2015a, 2015b; Mohammad & Ahmed, 2017).

1.1. Hypothesis

H1: We hypothesize that UPF consumption and emotional eating might be significantly low in male varsity badminton players as compared to non-athlete players of the university.

H2: We assume that emotional eating may be positively predicted by using UPF consumption in both male badminton athletes and non-athletes of university.

H3: We propose that higher emotional eating might also be predicted by using UPF stuffs among male varsity badminton players, possibly due to distinctive stressors related to athletic input.

2. Literature Review

Some of the studies that were conducted in the past to assess have suggested that participation in sports activities of university students were observed to promote healthier eating by reducing ultra-processed food (UPF) intake (Craig, 2024; Forsyth & Mantzioris, 2023). This might be due to the reason that student athletes usually prioritize those foods which have the ability to improve their recovery and performance rather than those UPFs. These foods may include whole grains, fruits and vegetables which also improve their overall physical, mental and

psychological well-being (Fondevila-Gascón et al., 2022; Ruiz-Roso et al., 2020). Additionally, it has also been observed that this change in their dietary choice may be largely due to their higher nutritional attentiveness. This might be because athletes have been suggested to better understand how food influences their performance than non-athlete students (Thomas, Erdman, & Burke, 2016). Regular sports activity inclines to stabilize mood and decreases emotional prompts that might lead to unhealthy food varieties. Sports involvement is known to increase endorphin levels, which helps to normalize mood and release stress, dropping the chance of turning to UPF foodstuffs as a comforting practice (Annesi, 2023; Izydorczyk et al., 2019). Undergraduates engaged in systematized sports often establish better emotional flexibility, which can benefit them to rely less on UPF products during hard situations (Leow et al., 2018).

3. Materials And Methods

3.1. Methodological Design

A quantitative cross-sectional study design was used in this research.

3.2. Population and Sample Size

For the purpose of data collection, we selected all universities that had a male badminton team from a big city of Pakistan. Only eight major universities were found eligible as they had a male badminton team that represented them at various intervarsity competitions held in Pakistan. Each badminton team was comprised of seven male players, resulting in a total of 56 male badminton players ($M = 21.34$ and $SD = 1.81$) from eight universities. Additionally, 56 male non-athlete students ($M = 21.79$, $SD = 1.42$) with same age, department, study program, academic year and semester from same universities were also selected as control group. Hence, the final sample comprised of the total population of male badminton players and their controls from eight universities of a big city of Pakistan (112 undergraduates ($M = 21.74$, $SD = 1.76$)).

3.3. Data Collection Instruments

Data was collected using a self-reported questionnaire that was composed of following three sections:

3.3.1. Demographic Questionnaire

Basic demographic information of participants having different backgrounds were collected through a self-administered demographic questionnaire. It was composed of following items such as, name of the university, study program, semester, age, height, weight, athletic status. If respondents mentioned themselves as badminton athletes, then information related to their training hours in a day, level of participation and BMI was also collected.

3.3.2. Screening questionnaire of highly processed food consumption (SQ-HPF)

This questionnaire was developed by Martinez-Perez et al. (2022) and was utilized in this study to measure the consumption of ultra-processed foods among male varsity badminton players and non-athlete students. The SQ-HPF consists of fourteen items and is a moderately effective and reliable tool to measure consumption of ultra-processed foods as it possesses a Cronbach's alpha score of 0.67 as reported by Martinez-Perez et al. (2022). The global score of the participants was calculated by totaling together all of their responses to the scale. It was further classified into 3 categories high, moderate, and low consumption level. No additional modifications were required for this tool to be used for varsity badminton players of Pakistan as this tool was validated and culturally appropriate for this specific demographic

3.3.3. Emotional Eating Questionnaire (EEQ)

The EEQ, used in the study, was developed by Garaulet et al. (2012) to measure the emotional eating among individuals. This scale consists of ten items. Four responses from never to always were offered against each question in the questionnaire. The participant's global score value or score classifications were calculated by adding their total responses. According to the global scale, a value of 0-5 indicated non-emotional consumers, a value of 6-10 showed less emotional consumer, the score of 11-20 indicated emotional eaters, and a score of 21-30 indicated more emotional eater. The Cronbach's alpha value of this tool as reported by Ayyildiz et al. (2023) and Sosa-Cordobes et al. (2022) ranged from 0.72 to 0.859 indicating high reliability and validity.

3.4. Data Collection Procedure

Firstly, the author’s consent was obtained through email before any questionnaire could be used in the study. Secondly, the researcher also ensured informed consent from participants. The participants were clarified that their partaking was voluntary and that all information collected from them will not be shared to anyone. Participants were given clear instructions regarding the questionnaire and were also free to ask any question about the questionnaire. Each participant was given 15-20 minutes to answer all the questions in the questionnaire.

3.5. Data Analysis

The SPSS version 27 was applied for data investigation (IBM Corp, 2020). Descriptive tests, the independent samples t-test and simple linear regression were applied for data analysis. The *p* value was fixed at .05 to assess the level of significance.

4. Results

Male varsity badminton players displayed healthier eating patterns, with 94.6% reporting low consumption of ultra processed foods, and only 1.8% falling into the high consumption category. Emotional eating was present, but more controlled, with 48.2% identified as emotional eaters and just 3.6% as very emotional eaters. This suggests that male varsity badminton players maintain better dietary habits and emotional regulation, likely due to their active and structured routines.

Table 1: Prevalence of Ultra-Processed Food Intake and Emotional Eating Among Male Varsity Badminton Players and Non-athlete Students

Variables	Non-Athlete Students (f, % age)	Male Varsity Badminton Players (f, % age)
Ultra-processed foods category		
Low	15 (26.8%)	53 (94.6%)
Medium	36 (64.3%)	2 (3.6%)
High	5 (8.9%)	1 (1.8%)
Emotional Eating Category		
Non-emotional eater	3 (5.4%)	5 (8.9%)
Low emotional eater	17 (30.4%)	22 (39.3%)
Emotional eater	33 (58.9%)	27 (48.2%)
Very emotional eater	3 (5.4%)	2 (3.6%)

In contrast, non-athlete students showed higher ingestion of ultra-processed foodstuffs, with 64.3% in the medium category and 8.9% consuming high levels. Emotional eating was also more pronounced, with 58.9% identified as emotional eaters. These findings suggest non-athlete students are more prone to unhealthy eating habits and emotional eating, possibly due to a lack of sports activity or non-exercise habits.

Table 2: Regression Coefficients of Ultra-Processed Food Consumption on Emotional Eating Among Non-Athletes University Students

Dependent Variable	Predictor Variable	B	β	SE	R ²	P
Emotional Eating	Ultra-Processed Food consumption	0.735	0.400	0.229	0.160	0.002

Note: β = regression coefficient, R² = coefficient of determination

The outcome of ultra-processed diet intake on emotional eating among non-athlete university students is shown in Table 2. Ultra-processed foodstuff ingestion was the predictor variable, and emotional eating was the dependent variable. The obtained results indicated that ultra-processed diet consumption has a significant positive association with emotional eating among non-athlete university students ($\beta = 0.400$, $p = 0.002$). The R² value of 0.160 showed that ultra-processed food consumption explained 16% of the variance in emotional eating, with $F(1, 54) = 10.311$, $p = 0.002$. This leads to the conclusion that, the more ingestion of ultra-processed foods, the more is the level of emotional eating among non-athlete university students.

Table 3: Regression Coefficients of Ultra-Processed Food Consumption on Emotional Eating Among Male Varsity Badminton Players

Dependent variable	Predictor Variable	B	β	SE	R ²	P
Emotional Eating	Ultra-Processed Food	1.465	0.570	0.288	0.325	0.000

Note: β = regression coefficient, R^2 = coefficient of determination

The results revealed a significant positive association between UPF consumption and emotional eating among male varsity badminton athletes ($\beta = 0.570, p = 0.000$). The R^2 value of 0.325 indicates that ultra-processed food consumption accounted for 32.5% of the alteration in emotional eating, with $F(1, 54) = 25.970, p = 0.000$. This indicated that UPF consumption significantly influences emotional eating levels among male varsity badminton players. Higher levels of UPF consumption are related with increased emotional eating behaviors in this group.

Table 4: Mean Comparison of Consumption of Ultra Processed Food and Emotional Eating Scores Among Male Varsity Badminton Players and Non-Athlete University Students

	Male Varsity Badminton Players		Non-Athlete Students		t (110)	p	Cohen's d
	M	SD	M	SD			
Ultra Processed Food Consumption	2.34	1.81	5.79	2.42	8.54	.001	2.14
Emotional Eating	11.23	4.66	12.61	4.44	1.60	.113	0.30

An independent samples t-test was conducted to measure differences in ultra-processed food consumption and emotional eating behaviors between male varsity badminton players and non-athlete students. The analysis revealed a significant difference in ultra-processed food scores between the two groups, with non-athlete students scoring higher ($M = 5.79, SD = 2.42$) than male varsity badminton athletes ($M = 2.34, SD = 1.81$), $t(110) = 8.54, p < .001$. This indicates that non-athlete students consumed more ultra-processed food as compared to male varsity badminton athletes. The effect size (Cohen's $d = 2.14$) reflects a large and significant difference. For emotional eating scores, no statistically significant difference was found between non-athlete students ($M = 12.61, SD = 4.44$) and male varsity badminton athletes ($M = 11.23, SD = 4.66$), $t(110) = 1.60, p = .113$.

5. Discussion

This research primarily included three aims that involved measuring the prevalence, examining the association and assessing the differences between UPF consumption and emotional eating among male varsity badminton players and non-athlete university students. The findings of the study revealed that male varsity badminton players reported low prevalence of both UPF consumption and emotional eating as compared to non-athlete university students. Additionally, it was also observed that there was a significant positive association between UPF consumption and emotional eating among both groups. Lastly, male varsity badminton players reported low UPF consumption as compared to non-athlete university students. However, no significant mean differences in emotional eating scores were reported among both groups. These findings highlight the significance of participating in individual sports particularly badminton to counter emotional eating and reduce the consumption of UPFs among varsity students.

The findings of this research revealed low prevalence of both UPF consumption and emotional eating among male varsity badminton players as compared to non-athlete university students. These findings are in line with studies that were conducted in the past which reported low UPF consumption and emotional eating levels among sports participating individuals (Bui et al., 2021). For instance, a study conducted on university students to assess their disordered eating rates suggested that male athlete university students reported low disordered eating rates as compared to non-athlete students. (Moeller, 2022). Similarly, another study conducted on university level student gymnasts and non-athletes to assess the consumption of fast-food suggested that student athletes who were gymnasts reported low fast-food consumption when compared to their non-athlete counterparts (Sohail, Ali, & Ahmed, 2023). This might be due to the reason that student athletes are consistently involved in regular physical exercise and are more concerned about their dietary choices (Ali et al., 2015). Furthermore, this minimal UPF intake among male varsity badminton athletes indicates healthier dietary practices which can be associated with dietary knowledge that naturally come along with active sports participation (Lee et al., 2018). However, the study reported no significant mean differences in emotional eating scores of both groups. This suggests that emotional eating might be influenced more by stress or academic pressures rather than by one's athletic status. However, further clinical evidence is mandatorily required in this regard to validate these assumptions.

Additionally, the findings also revealed a significant positive association between UPF consumption and emotional eating suggesting that high consumption of UPF may exacerbate emotional eating behaviors among both groups. These findings are in line with a past study conducted during Covid-19 to assess the association between emotional eating, psychological stress and UPF addiction. The findings of the study suggested that addiction of UPFs was significantly associated with emotional eating among undergraduate students (Stariolo et al., 2024). The underlying mechanism behind this association is still an area of active research however, it can be suggested that due to high sugary content in UPFs, their consumption triggers the release of pleasure hormone known as dopamine (Machado-Rodrigues et al., 2024). Furthermore, it may also activate the brain's rewarding system which in turn may lead individuals to consumption of these foods for comfort during stress, thus fostering emotional eating among them (Kabasakal Cetin, 2023). However, in varsity athletes, particularly male varsity badminton players, it can be suggested that due to high physical and mental demands of the sport, they experience extremely high stress levels (Lin et al., 2017). These heightened stress levels due to intense periods of training might lead them to consume UPFs for their convenience and quick energy (Lopes Cortes et al., 2021). Lastly, the results of the t-test analysis revealed that UPF consumption was significantly high in non-athlete university students as compared to male varsity badminton players. These findings support the results from previous studies (Beer et al., 2017; Eck, 2020; Holliday & Blannin, 2017; Sohail, Ali, & Ahmed, 2023), indicating that athletes prefer to consume whole food products in terms of performance, whereas non-athletes may resort more to consuming UPFs due to convenience or general lack of dietary guidance. The tendency of sports to promote physical activities likely encourages more positive food choices, reiterating the physical and mental benefits structured participation in sports provides (Schulenkorf & Siefken, 2019). However, no significant differences in the mean scores of emotional eating were reported among both groups.

5.1. Practical Implications

The findings of this study highlight the potential benefits of integrating individual sport programs particularly badminton sport to not only improve physical health but also to encourage healthier food selection to control UPF- related emotional eating behaviors among varsity students. Furthermore, it also highlights the need for dietary counselling or tailored workshops that are specifically designed to promote healthier dietary choices among non-athlete varsity students.

5.2. Directions for future research

For greater generalizability, future research should be conducted using other types of individual and team sports while accompanying a more diverse population as this study involved sample from one city particular urban city only. Furthermore, they should sample from other urban cities and countries to provide a broader perspective and enhance the study's applicability to a wider population. Additionally, stronger study designs including experimental and longitudinal studies should be conducted to assess the long-term effects of engagement in sports of varied intensity on emotional eating and UPF consumption. Finally, exploring the role of particular stressors that are present in diverse sports environments might also help the relevant professionals in optimizing approaches dedicated to promoting student athletes' mental and nutritional health.

6. Conclusion

In conclusion, the findings of this study indicate that participation in individual sports particularly badminton might reduce UPF consumption and emotional eating behavior among varsity students. This underlines the significance of raising structured sports participation to increase both physical and emotional health in university students. However, further studies with strong study designs are required to strengthen the evidence generated from this study.

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