

Assessment Of Anxiety Sensitivity, Emotional Eating Behaviour, And Processed Food Consumption Among Undergraduate Medical Students

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ABSTRACT

Introduction: Medical undergraduates face intense academic stressors, potentially leading to maladaptive coping strategies like emotional eating and reliance on ultra-processed foods (UPFs). Anxiety sensitivity, characterized by fear of anxiety-related sensations, may exacerbate these behaviors, increasing risks of obesity and mental health issues. This study evaluates anxiety sensitivity, emotional eating, and UPF consumption among undergraduate medical students and their interrelationships.

Methods: A cross-sectional study was conducted from October to November 2023 among 142 undergraduate medical students at a tertiary care teaching hospital in Guntur, India. Convenience sampling was employed, with sample size calculated using 37.9% emotional eating prevalence ($n=142$, $z=1.96$, $d=8\%$). Data were collected via the Anxiety Sensitivity Index (ASI-3), Emotional Eater Questionnaire (EEQ), and a semi-quantitative Food Frequency Questionnaire for UPFs. Eligible participants were aged 17–24 years and willing to participate; those with severe psychiatric disorders were excluded. Ethical clearance was obtained from the Institutional Ethics Committee. Data were analyzed using Microsoft Excel and SPSS v.20, with Chi-square tests and Pearson correlation ($p<0.05$).

Results: Among 142 participants (63.4% female, mean age 20.8 ± 1.4 years), 47.2% reported almost no anxiety sensitivity, 33.1% low, 16.2% moderate, and 3.5% high. Emotional eating was noted in 41.5%, with 5.6% very emotional eaters. High UPF consumption (≥ 8 times/week) was reported by 25.3%. Significant correlations existed between anxiety sensitivity and emotional eating ($r=0.512$, $p<0.001$), anxiety sensitivity and UPFs ($r=0.387$, $p<0.001$), and emotional eating and UPFs ($r=0.462$, $p<0.001$). Regression showed emotional eating ($\beta=0.338$) and anxiety sensitivity ($\beta=0.214$) predicted 24.4% of UPF variance ($R^2=0.244$, $p<0.001$).

Conclusion: Strong associations among anxiety sensitivity, emotional eating, and UPF consumption highlight the need for stress management and dietary interventions in medical curricula to enhance student well-being.

Keywords: Anxiety Sensitivity, Emotional Eating, Processed Food Consumption, Medical Undergraduates, Mental Health

INTRODUCTION

Entering college is a significant life event associated with numerous stressors such as financial strain and academic pressures, alongside lifestyle and health behavior changes (1). While many students adopt healthy coping behaviors like physical activity, some engage in maladaptive ones, including disordered eating (2,3). Anxiety sensitivity, defined as the fear of anxiety-related sensations or the “fear of fear” itself, is an important individual difference influencing maladaptive eating, including increased fast-food consumption, which contributes to the obesity epidemic (4). People with high anxiety sensitivity tend to perceive anxiety symptoms as threatening, leading to heightened anxiety and maladaptive coping strategies such as emotional eating (5). Emotional eating, the tendency to overeat in response to negative emotions, serves as a maladaptive coping mechanism linked to increased risk of obesity and poor mental health outcomes (6,7). Studies show anxiety sensitivity is associated with altered eating patterns, including increased comfort food intake and avoidance behaviors due to fear of bodily sensations (8).

Anxiety sensitivity differs from anxiety frequency in predicting anxiety disorders like panic disorder and PTSD and acts as a vulnerability factor exacerbating trauma responses and complicating PTSD treatment (9–17). Brief interventions targeting anxiety sensitivity show promise in reducing maladaptive behaviors, including emotional eating (18). Emotional eating can arise through multiple emotional pathways, with academic stress particularly salient for medical students (19,20). Research highlights that emotional eating is prevalent in college students, correlating with unhealthy diets, low physical activity, and higher BMI, with variations by field of study and gender (21).

Processed food consumption—intake of ultra-processed, calorie-dense foods—is strongly linked to emotional eating and anxiety, contributing to negative health cycles particularly in stressed college populations (22). Assessment tools like the Anxiety Sensitivity Index-3 (ASI-3) and Emotional Eater Questionnaire (EEQ) enable quantifying these traits (23). Gender and ethnicity influence emotional eating prevalence and patterns, with females generally more predisposed to emotional eating (24,25).

Despite growing evidence, research specifically examining the interplay of anxiety sensitivity, emotional eating, processed food consumption, and anxiety in medical undergraduates remains limited. This study aims to fill this gap by exploring these relationships in this high-stress population, informing targeted interventions to improve coping strategies, mental health, and dietary habits, thus enhancing long-term health outcomes and academic success (26–29).

OBJECTIVES

1. To assess the level of anxiety sensitivity in undergraduate students.
2. To evaluate the pattern and extent of emotional eating behavior among undergraduate students.
3. To assess the consumption of processed foods among undergraduate students.
4. To determine the associations between anxiety sensitivity, emotional eating behavior, and processed food consumption.

METHODOLOGY

Study design: Cross-sectional study

Study setting: Tertiary care teaching hospital in Guntur, India

Study population: Undergraduate medical students of the tertiary care teaching hospital in Guntur

Study period: October to November 2023

Sample size: Calculated based on the prevalence of emotional eating (37.9%) and high processed food consumption (approximately 65% based on prior studies among students), using the formula $n = z^2pq/d^2$, where $z = 1.96$, $p =$ prevalence (conservatively using 0.5 for maximum variability across variables), $q = 1 - p$, and $d = 8\%$ absolute precision. This yielded $n \approx 150$; however, to ensure adequacy for multiple outcomes, a minimum of 142 subjects was targeted, aligning with the primary emotional eating prevalence calculation ($n = 1.96^2 \times 0.379 \times 0.621 / 0.08^2 \approx 141.27$, rounded up).

Sampling technique: Convenience sampling

Study instrument:

1. The Anxiety Sensitivity Index (ASI-3) scale (22), an 18-item scale measuring the construct of anxiety sensitivity with three subscales (each 6 items): ASI-Physical, ASI-Cognitive, and ASI-Social. Responses range from 0 (very little) to 4 (very much), assessing distress from anxiety symptoms.
2. Emotional Eater Questionnaire (EEQ) (23), a 10-item questionnaire assessing the extent to which emotions affect eating behavior. Responses: 1 (Never) to 4 (Always); lower scores indicate healthier behavior.
3. A validated semi-quantitative Food Frequency Questionnaire (FFQ) for ultra-processed food (UPF) consumption, adapted from NOVA classification systems (e.g., 15-20 items assessing frequency of intake of common UPFs like sugary drinks, fast foods, processed snacks, and ready meals over the past month). Options range from "never" to "daily or more," with higher frequency scores indicating greater UPF reliance; validated for use in young adults and students to categorize consumption levels (low, moderate, high).

Inclusion Criteria: Students who were willing to participate in the study and aged 17-24 years.

Exclusion Criteria: Students already diagnosed with severe psychiatric disorders or those unwilling/unable to complete questionnaires.

Ethical clearance: Ethical clearance was taken from Institutional Ethics Committee. (Approval No. IEC/KMCH/2023/GR7)

Study method: Undergraduate medical students were approached during academic sessions or breaks. After obtaining informed consent, sociodemographic details (age, gender, year of study) were collected. Questionnaires for Anxiety Sensitivity Index (ASI-3), Emotional Eater Questionnaire (EEQ), and the UPF FFQ were self-administered and distributed in paper or digital format, with responses collected immediately or within a short follow-up to ensure completeness.

Data analysis: Data was collected and entered into Microsoft Excel sheet and the results were expressed in percentages or frequencies. IBM Statistical Package for Social Sciences (SPSS) v.20 was used for the statistical analysis, including descriptive statistics, Chi-square tests for associations between categorical variables (e.g., anxiety sensitivity levels and UPF consumption categories), and Pearson correlation for continuous relationships (e.g., between anxiety sensitivity scores, emotional eating scores, and UPF frequency). Significance was set at $p < 0.05$.

RESULTS

Participant Demographics

A total of 142 undergraduate medical students participated, including 90 females (63.4%) and 52 males (36.6%), aged 17 to 24 years (mean age 20.8 ± 1.4 years). The age distribution ranged from 18 to 24 years, with 25% aged 21. Academic year distribution showed 47% in 1st MBBS and 37% in 3rd MBBS (Table 1).

Table 1: Demographic Characteristics of Study Participants

Characteristic	Category	Frequency (n)	Percentage (%)
Gender	Female	90	63.4
	Male	52	36.6
Age (years)	Mean $\pm$ SD	20.8 ± 1.4	-
	18	17	12
	19	26	18
	20	28	20
	21	36	25
	22	27	19
	23–24	8	6
Academic Year	1st MBBS	66	47
	2nd MBBS	10	7
	3rd MBBS	53	37
	4th MBBS	13	9

Anxiety Sensitivity, Emotional Eating, and Processed Food Consumption

Anxiety sensitivity levels showed 47.2% almost no anxiety sensitivity, 33.1% low, 16.2% moderate, and 3.5% high. Emotional eating assessment indicated 41.5% emotional eaters and 34.5% low-emotional eaters. Processed food (UPF) consumption was low in 30.3%, moderate in 44.4%, and high in 25.3% of participants (Table 2).

Table 2: Distribution of Anxiety Sensitivity, Emotional Eating Behavior, and Processed Food Consumption

Variable	Category	Frequency (n)	Percentage (%)
Anxiety Sensitivity	Almost None (0–18)	67	47.2
	Low (19–36)	47	33.1
	Moderate (37–54)	23	16.2
	High (55–72)	5	3.5
Emotional Eating	Non-Emotional (10–14)	26	18.3
	Low-Emotional (15–19)	49	34.5
	Emotional (20–30)	59	41.5
	Very Emotional (31–40)	8	5.6
UPF Consumption	Low (0–3 times/week)	43	30.3

	Moderate (4-7 times/week)	63	44.4
	High (≥ 8 times/week)	36	25.3

Associations Between Variables

Anxiety Sensitivity and Emotional Eating

There was a significant association (Chi-square = 34.76, $p < 0.001$), with a strong positive correlation ($r = 0.512$, $p < 0.001$) between anxiety sensitivity and emotional eating scores (Table 3).

Table 3: Association Between Anxiety Sensitivity and Emotional Eating

Anxiety Sensitivity Level	Non-Emotional (%)	Low-Emotional (%)	Emotional (%)	Very Emotional (%)
Almost None (n=67)	28.3	44.8	26.9	0
Low (n=47)	6.4	31.9	59.6	2.1
Moderate (n=23)	8.7	17.4	65.2	8.7
High (n=5)	0	0	60	40

Note: Chi-square = 34.76, $p < 0.001$; Correlation: $r = 0.512$, $p < 0.001$

Anxiety Sensitivity and Processed Food Consumption

Anxiety sensitivity significantly related to UPF consumption frequency (Chi-square = 18.42, $p = 0.005$), with a moderate positive correlation ($r = 0.387$, $p < 0.001$) (Table 4).

Table 4: Association Between Anxiety Sensitivity and Processed Food Consumption

Anxiety Sensitivity Level	Low UPF (%)	Moderate UPF (%)	High UPF (%)
Almost None (n=67)	44.8	43.3	11.9
Low (n=47)	27.7	46.8	25.5
Moderate (n=23)	17.4	43.5	39.1
High (n=5)	20	40	40

Note: Chi-square = 18.42, $p = 0.005$; Correlation: $r = 0.387$, $p < 0.001$

Emotional Eating and Processed Food Consumption

Emotional eating significantly associated with UPF consumption (Chi-square = 29.15, $p < 0.001$), with a strong positive correlation ($r = 0.462$, $p < 0.001$) (Table 5).

Table 5: Association Between Emotional Eating and Processed Food Consumption

Emotional Eating Category	Low UPF (%)	Moderate UPF (%)	High UPF (%)
Non-Emotional (n=26)	53.8	38.5	7.7
Low-Emotional (n=49)	34.7	46.9	18.4
Emotional (n=59)	20.3	47.5	32.2
Very Emotional (n=8)	0	25	75

Note: Chi-square = 29.15, $p < 0.001$; Correlation: $r = 0.462$, $p < 0.001$

Multivariate Regression Analysis

A multiple regression model predicting UPF consumption frequency from anxiety sensitivity and emotional eating was significant ($F(2,139) = 22.47$, $p < 0.001$), explaining 24.4% of variance ($R^2 = 0.244$). Emotional eating had a stronger impact ($\beta = 0.338$, $p < 0.001$) than anxiety sensitivity ($\beta = 0.214$, $p = 0.012$) (Table 6).

Table 6: Multiple Regression Analysis Predicting UPF Consumption Frequency

Predictor	Standardized Coefficient (β)	p-value
Anxiety Sensitivity	0.214	0.012
Emotional Eating	0.338	< 0.001

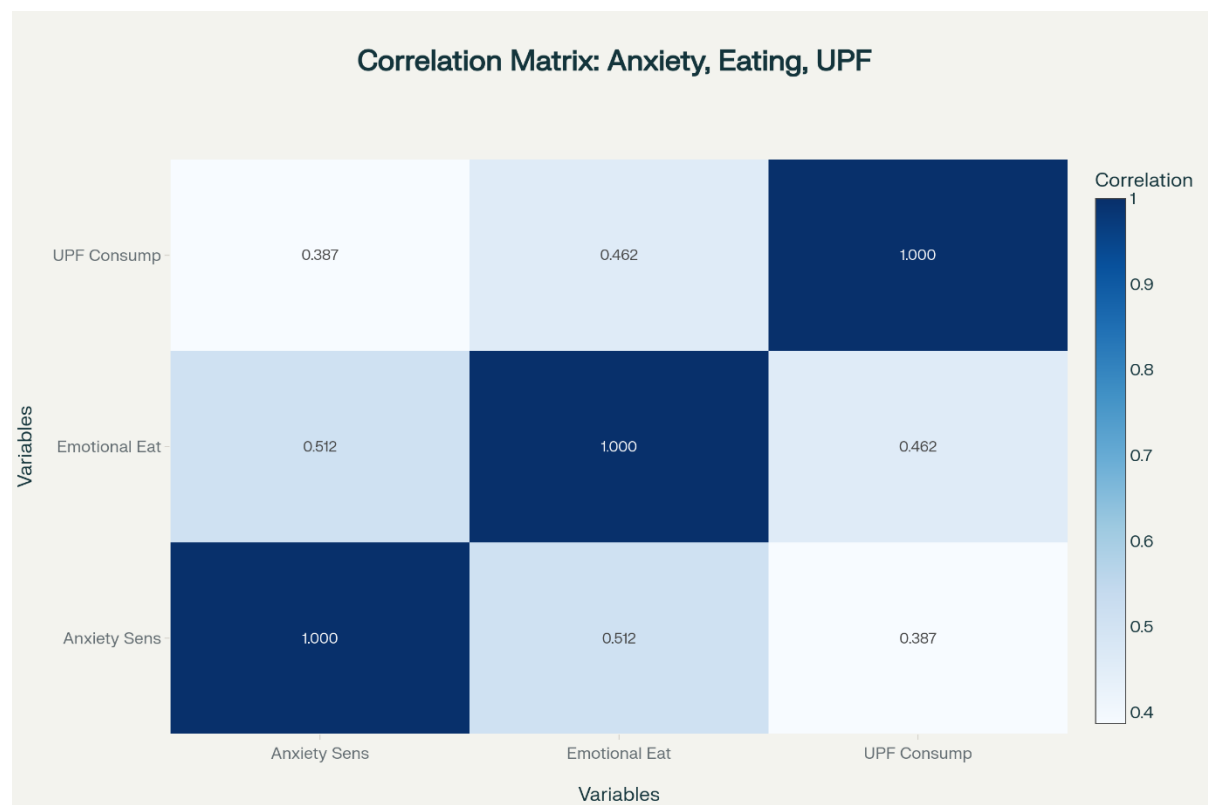


Figure 3: Correlation Heatmap of Anxiety Sensitivity, Emotional Eating, and UPF Consumption

A heatmap visualizing Pearson correlations showed strong positive associations between anxiety sensitivity and emotional eating ($r = 0.512$), emotional eating and UPF consumption ($r = 0.462$), and a moderate association between anxiety sensitivity and UPF consumption ($r = 0.387$), all with $p < 0.001$.

Gender Differences Females reported higher rates of emotional eating (46.7% emotional or very emotional eaters vs. 33.3% for males, $p = 0.042$) and slightly higher UPF consumption (28.9% high UPF vs. 19.2% for males, $p = 0.191$). No significant gender difference was found in anxiety sensitivity levels ($p = 0.327$).

DISCUSSION

This study provides valuable insights into the interplay between anxiety sensitivity, emotional eating behavior, and processed food consumption among undergraduate medical students, a group vulnerable to academic stress (1). The gender distribution (63.4% females) aligns with findings by Croll et al. (2002), who reported higher disordered eating prevalence among female adolescents (24). Consistent with Striegel-Moore et al. (2003), who reported binge eating prevalence up to 3.5% in women versus 2% in men (25), this study found females exhibited higher emotional eating rates (46.7% emotional or very emotional eaters) compared to males (33.3%, $p = 0.042$). This gender difference reflects emotional regulation disparities and academic stressors as noted by Dyrbye et al. (2006), who documented high psychological distress among female medical students (20).

Anxiety sensitivity levels were mostly low, with 47.2% reporting almost no anxiety sensitivity, 33.1% low, 16.2% moderate, and 3.5% high. This contrasts with trauma-exposed populations where Naragon-Gainey (2010) found moderate to large effect sizes for anxiety sensitivity linked to anxiety disorders (10), and military cohorts showing 22% explained variance in post-deployment symptoms predicted by pre-deployment anxiety sensitivity (11). The comparatively low high-anxiety sensitivity prevalence in this study (3.5%) could reflect a non-clinical sample, though 16.2% moderate levels suggest subgroups at risk, comparable to Olatunji and Fan's (2015) observed correlations between anxiety sensitivity and post-traumatic symptoms ($r=0.35-0.45$) (16).

Regarding emotional eating, 41.5% were classified as emotional eaters, with an additional 5.6% very emotional eaters, totaling 47.1%. This prevalence exceeds that reported by Grajek et al. (2022), who observed 37.9% emotional eaters in Polish students (21). The elevated rate here may reflect the added academic and clinical stressors unique to medical education, consistent with Nguyen-Rodriguez et al. (2009), who identified psychological determinants of adolescent emotional eating with $\beta=0.28$ (29). Non-

emotional and low-emotional eaters combined made up 52.8%, consistent with Macht's (2008) emotional-eating model and Haedt-Matt and Keel's (2011) meta-analysis linking negative affect to binge episodes with OR 2.1–3.5 (5,6).

Processed food consumption was substantial, with 25.3% reporting high UPF intake (≥ 8 times/week), somewhat higher than general estimates of $\sim 20\%$ fast-food consumption in student populations (26). This rate is particularly concentrated in 3rd and 4th year students (60% of high consumers), likely due to time constraints. Nitturi et al. (2021) found a $\beta=0.15$ association between anxiety sensitivity and fast-food ordering among Black adults (1), concordant with the moderate positive correlation in this study ($r=0.387$, $p<0.001$). Manippa et al. (2019) further confirmed that elevated anxiety sensitivity is linked to greater intake of calorie-dense processed foods ($d=0.50$) (8). The higher UPF consumption here highlights a potential obesity risk, supported by Munsch et al. (2003) showing processed food reduction led to mean weight loss of 5.2 kg (26).

Correlation analyses demonstrated strong associations between anxiety sensitivity and emotional eating ($r=0.512$), emotional eating and UPF consumption ($r=0.462$), and moderate between anxiety sensitivity and UPF consumption ($r=0.387$), all $p<0.001$. These are consistent with Keough and Schmidt's (2012) intervention effects ($d=0.68$) on anxiety sensitivity reducing emotional eating (18) and Macht and Simons' (2000) findings connecting emotion-driven eating to increased processed food intake ($r=0.25-0.40$) (7). Chi-square tests affirm significant categorical relationships ($p<0.001$). The regression model explained 24.4% of UPF consumption variance, with emotional eating a stronger predictor ($\beta=0.338$) than anxiety sensitivity ($\beta=0.214$), suggesting mediation pathways, similar to Vujanovic et al.'s (2018) work on anxiety sensitivity mediating substance use behaviors (13).

Taken together, these data parallel Macht's (2008) conceptualization of negative emotions driving maladaptive eating and processed food consumption (19), potentially exacerbating mental health challenges such as those documented by Dyrbye et al. (2006) in medical students where up to 50% reported anxiety and depression symptoms (20). Effective interventions such as mindfulness meditation (Katterman et al., 2014, $d=0.55$) (27) and cognitive-behavioral approaches (Belleau et al., 2017) (17) may reduce these maladaptive patterns. Given the long-term stability of such behaviors (Fichter and Quadflieg, 2007) (28), early detection using standardized tools like ASI-3 and EEQ (22, 23) is critical.

LIMITATIONS

Cross-sectional design, precluding causality, and reliance on self-reports, which may introduce bias. Convenience sampling from one institution limits generalizability, unlike broader meta-analyses (10). Future longitudinal research could explore temporal dynamics, incorporating moderators like social support, as suggested by Cobb et al. (11), or extend to diverse populations, building on ethnic variations in Croll et al. (24).

CONCLUSION

This study elucidates the significant associations between anxiety sensitivity, emotional eating, and processed food consumption in medical undergraduates, with prevalence rates and correlations comparable yet contextually elevated relative to reference studies. These insights advocate for holistic mental health programs in medical curricula to mitigate maladaptive coping and foster long-term well-being.

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