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Prevalence of eating disorders and their association with depression, anxiety, and stress among high school students in suburban areas in Vietnam

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ABSTRACT

Eating disorders are a growing concern among adolescents, often associated with mental health issues like depression, anxiety, and stress. Limited evidence exists on their prevalence and contributing factors in suburban areas in Vietnam. This study aimed to assess the prevalence of eating disorders and their relationship with mental health factors among high school students in these areas. A descriptive cross-sectional survey was conducted with 426 high school students from suburban areas of major Vietnamese cities. The EAT-26 (eating attitudes test-26) and BITE (bulimic investigatory test Edinburgh) questionnaires were used to evaluate eating disorders, while the DASS-21 scale measured levels of depression, anxiety, and stress. The findings showed that 57.7% of participants exhibited signs of eating disorders. Logistic regression analysis identified significant associations between eating disorders and gender, eating habits, body image concerns, and mental health indicators (p-value < 0.05). In conclusion, this study highlights the high prevalence of eating disorders among suburban high school students in Vietnam. The strong associations with gender, eating habits, body image, and mental health factors emphasize the urgent need for targeted interventions and mental health support tailored to this vulnerable population.

INTRODUCTION

Eating disorders (ED) are a severe form of mental illness that significantly impacts both physical and psychological health, increasing the risk of comorbidities and mortality. ED are characterized by persistent disruptions in eating behaviors, leading to altered food intake and absorption that impair physical health and psychosocial functioning [1]. Globally, the prevalence of ED has risen markedly in recent years, particularly in developed and high-income countries [2]. For instance, a study in Spain reported a high-risk prevalence of ED at 14.9% in males and 20.8% in females [3]. Moreover, the prevalence of ED has been increasing across Asia, with Japan reporting the highest rates, followed by Hong Kong, Singapore, Taiwan, South Korea, and other Southeast Asian countries [2].

In Vietnam, research on ED among adolescents remains limited despite its growing significance. A 2023 study at Duy Tan University found that 23.5% of students were at risk of ED [4]. Similarly, a 2020 study conducted at Phu Cat No. 1 High School in Binh Dinh Province revealed that 44.5% of students had eating disorders [5]. These findings underscore that ED is not confined to adults but is increasingly prevalent among adolescents, a population particularly vulnerable to its effects.

Adolescence is a critical developmental stage marked by significant physical, psychological, and social changes. Factors such as failure to achieve expected weight or height, poor eating habits, academic pressures, and excessive concerns about body image during this period may contribute to the development of ED. These conditions are often associated with other mental health disorders, such as bipolar disorder, depression, and anxiety. Alarmingly, ED is one of the leading causes of mortality in this age group, second only to suicide [4,5].

Despite the growing global attention to ED, research in Vietnam, particularly in suburban areas near major cities, remains scarce. These areas, where socio-economic conditions may influence eating behaviors and overall health, are often overlooked in public health research. High school students in such settings may be particularly susceptible to ED due to the combined influence of academic pressures, societal standards of appearance, and limited access to health education and resources.

This study aims to address this gap by determining the prevalence of ED and analyzing associated factors among high school students in a suburban area of Vietnam. The findings are expected to provide valuable scientific evidence to inform the development of targeted interventions and health education programs, ultimately contributing to the improvement of nutritional and mental health among students in similar contexts.

MATERIALS AND METHODS

Study design

A cross-sectional descriptive study was conducted from August 2024 to November 2024 in a suburban high school near a major city in Vietnam. The study aimed to investigate the prevalence of ED and its associated factors among adolescents.

Ethical approval

The Department of Research Methodology and Biostatistics, Institute of Preventive Medicine and Public Health, Hanoi Medical University, authorized this study by obtaining the informed consent of all participants (Approval number: PPNCK&TKYS-2024-07). Permission to conduct the research was also obtained from the school administration. Participants were informed about the study's objectives, provided written informed consent, and were assured of confidentiality and anonymity. All data were used solely for research purposes.

Study subjects

The target population for this study included high school students aged 15 to 18 years enrolled in the 2024–2025 academic year. The minimum sample size was calculated using a formula to estimate the population's proportion. The parameters used included a 95% confidence level, an expected prevalence of eating disorders of 44.5% (based on a prior study conducted in 2020 at Phu Cat No. 1 High School, Binh Dinh Province), and a margin of error set at 0.05. Substituting these values, the calculated minimum sample size was 380 participants.

To ensure adequate representation, stratified random sampling was employed. Students were stratified by grade level (10th, 11th, and 12th grades). Three classes per grade level were randomly selected using Excel software, and all students in these classes were invited to participate. The final sample comprised 426 students, exceeding

the calculated minimum. Exclusion criteria included incomplete survey responses, absenteeism during data collection, and illness. This approach ensured a statistically rigorous and representative sample for the study.

Data collection

Data were gathered using a self-administered questionnaire completed within 30 minutes in a classroom setting. The questionnaire consisted of the following components:

a) General demographics: Age, gender, grade level, and basic anthropometric data (height and weight).
b) Meal and physical activity patterns: Number of meals per day, breakfast frequency, and exercise habits.
c) Mental health assessment: Depression, anxiety, and stress levels were evaluated using the DASS-21 (Depression Anxiety Stress Scales-21) scale, validated in Vietnamese with a Cronbach's alpha of 0.9.
d) Eating disorder screening: EAT-26 (Eating Attitudes Test-26) and BITE (Bulimic Investigatory Test Edinburgh) questionnaires were used to assess disordered eating behaviors and tendencies toward bulimia nervosa or binge eating.

Instruments' Validation and Reliability

• EAT-26 is commonly used to identify disordered eating patterns. Its validity and reliability have been established in various populations, with scores ≥20 indicating risk.

• BITE is designed to screen for bulimia nervosa and binge eating behaviors. A score ≥10 suggests a risk of bulimic tendencies. Both tools were translated into Vietnamese and piloted in a subset of the population to ensure cultural and linguistic appropriateness.

Statistical analysis

Data was managed and analyzed using STATA 17.0. Initial data cleaning involved identifying and correcting missing or inconsistent entries to ensure accuracy. Descriptive statistics were calculated to summarize demographic characteristics and key study variables. Continuous variables were reported as mean ± standard deviation (SD), and categorical variables were presented as frequencies and percentages. Logistic regression analysis was conducted to identify factors associated with eating disorders, with adjustments for potential confounders. Results were expressed as odds ratios (OR) with 95% confidence intervals (CI), and statistical significance was determined at a threshold of $p < 0.05$.

RESULTS

Demographic and eating behavior characteristics of participants

Females 270/426 (63.38%) are more represented than males 156/426 (36.62%). The distribution across grade levels is relatively even, with Grade 12 having the highest representation, 151/426 (35.45%), followed by Grade 10, 141/426 (33.10%), and Grade 11, 134/426 (31.46%). Most participants consume three meals per day 262/426 (61.50%), while a notable portion eats less than three meals 112/426 (26.30%), and a smaller group consumes more than three 52/426 (12.20%). Breakfast consumption varies, with 215/426 (50.50%) regularly eating breakfast, 168/426 (39.40%) occasionally, and 42/426 (10.10%) rarely. Late-night eating is reported by 170/426 (39.90%) of participants, while 256/426 (60.10%) do not engage in this behavior (Table 1).

Table 1. Characteristics of participants.

Characteristics	Category	Frequency (n)	Percentage (%)
Gender	Male	156	36.62
	Female	270	63.38
Grade level	Grade 10	141	33.10
	Grade 11	134	31.46
	Grade 12	151	35.45
Number of meals per day	3 meals	262	61.50
	Less than 3 meals	112	26.30
	More than 3 meals	52	12.20
Breakfast frequency	Rarely	43	10.10
	Occasionally	168	39.40
	Regularly	215	50.50
Late-night eating frequency	No	256	60.10
	Yes	170	39.90

n = 426

Physical health and body image concerns of participants

Body mass index (BMI) classification indicates that the majority are in the normal range 367/426 (86.2%), with 30/426 (7.04%) underweight and 29/426 (6.76%) overweight. Exercise participation is reported by 253/426 (59.4%) of participants, yet only 80/426 (18.8%) achieve the recommended ≥150 minutes of physical activity per week, suggesting limited adherence to physical activity guidelines. Self-perception shows that 181/426 (42.5%) consider themselves balanced, while similar proportions perceive themselves as thin 123/426 (28.87%) or overweight 122/426 (28.63%). Concerns about body shape or excess fat are reported frequently by 115/426 (27.0%), with occasional and rare concerns at 151/426 (35.45%) and 160/426 (37.55%), respectively. Experiences of teasing or pressure regarding body shape are rare for most 265/426 (62.2%), but 132/426 (30.98%) occasionally experience it, and 29/426 (6.8%) frequently do (Table 2).

Table 2. Physical health and body image concerns of participants.

Characteristics	Category	Frequency (n)	Percentage (%)
BMI classification	Underweight	30	7.04
	Normal	367	86.2
	Overweight	29	6.76
Exercise participation	Yes	253	59.4
	No	173	40.6
Physical activity time	≥ 150 minutes/week	80	18.8
	< 150 minutes/week	346	81.2
Self-perception	Thin	123	28.87
	Balanced	181	42.5
	Overweight	122	28.63
Concern about excess fat/body shape	Rarely	160	37.55
	Occasionally	151	35.45
	Frequently	115	27.0
Teased or pressured about body shape	Rarely	265	62.2
	Occasionally	132	30.98
	Frequently	29	6.8
Thoughts about dieting	Rarely	248	58.22
	Occasionally	121	28.4
	Frequently	57	13.38

n = 426

Mental health characteristics of participants stratified by gender

Stress levels indicate that 301/426 (70.65%) of participants fall within the normal range, 112/426 (26.3%) experience mild to moderate stress, and 13/426 (3.05%) report severe stress. Females exhibit a higher prevalence of mild to moderate stress 82/270 (30.4%) than males 30/156 (19.23%). For anxiety, 190/426 (44.6%) of participants are classified as usual, while 185/426 (43.42%) experience mild to moderate levels, and 51/426 (11.97%) report severe anxiety. Severe anxiety is slightly more prevalent among females 35/270 (12.96%) than males 16/156 (10.26%). Depression is mainly within the normal range 326/426 (76.52%), though mild to moderate depression is observed in 88/426 (20.65%) of participants, and severe cases are minimal 12/426 (2.81%) (Table 3).

Table 3. Mental health characteristics of participants.

Characteristics	Category	Male (n = 156)	Female (n = 270)	Total (n = 426)
		n (%)		
Stress	Normal	122 (78.2)	179 (66.3)	301 (70.65)
	Mild - Moderate	30 (19.23)	82 (30.4)	112 (26.3)
	Severe	4 (2.56)	9 (3.33)	13 (3.05)
Anxiety	Normal	78 (50.0)	112 (41.5)	190 (44.6)
	Mild - Moderate	62 (39.74)	123 (45.56)	185 (43.42)
	Severe	16 (10.26)	35 (12.96)	51 (11.97)
Depression	Normal	122 (78.2)	204 (75.56)	326 (76.52)
	Mild - Moderate	30 (19.24)	58 (21.48)	88 (20.65)
	Severe	4 (2.56)	8 (2.96)	12 (2.81)

Characteristics of eating disorders among participants

Based on the EAT-26 (Eating Attitudes Test), 139/426 (32.62%) of participants scored ≥20, suggesting a substantial proportion may exhibit disordered eating behaviors. Additionally, the BITE (Bulimic Investigatory Test, Edinburgh) score indicates that 207/426 (48.6%) of participants scored ≥10, reflecting a significant prevalence of bulimic tendencies or behaviors within the population (Figure 1).

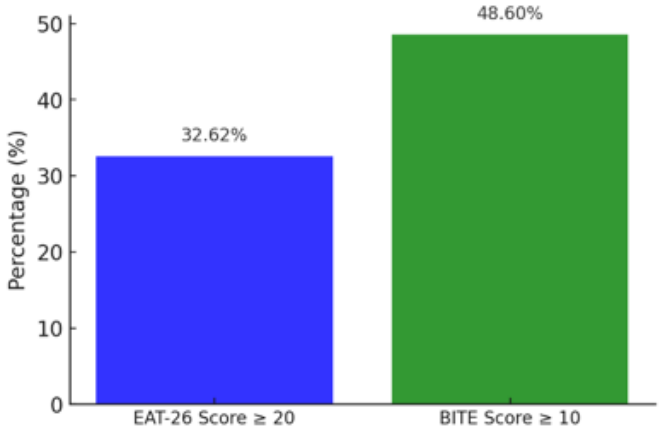

Figure 1. Eating disorder characteristics of participants. n = 426.

Factors associated with eating disorders of participants

Significant associations are observed across multiple variables. Participants consuming fewer than three meals daily (OR = 1.67, 95% CI: 1.05–2.63, p-value < 0.05) or more than three meals (OR = 2.51, 95% CI: 1.3–4.86, p-value < 0.05) show elevated odds of eating disorders. Late-night eating increases the odds (OR = 1.48, 95% CI: 1.00–2.21, p-value < 0.05). Self-perception of being overweight (OR = 2.51, 95% CI: 1.54–4.09, p-value < 0.05) and frequent concern about body shape (OR = 8.21, 95% CI: 4.49–15.01, p-value < 0.05) demonstrate strong associations. Experiencing teasing or pressure about body shape frequently (OR = 5.29, 95% CI: 1.96–14.3, p-value < 0.05) and frequent thoughts about dieting (OR = 9.91, 95% CI: 4.13–24.1, p-value < 0.05) further increased the risk. Mental health indicators, particularly severe anxiety (OR = 5.76, 95% CI: 2.72–12.2, p-value < 0.05) and mild-to-moderate stress (OR = 3.12, 95% CI: 1.91–5.09, p-value < 0.05), show significant associations (Table 4).

Table 4. Factors associated with eating disorders among participants.

Factors	Category	Eating Disorders		OR (95% CI)
		Yes (n = 246)	No (n = 180)	
Number of meals per day	3 meals	136 (51.91)	126 (48.09)	1
	< 3 meals	72 (64.29)	40 (35.71)	1.67 (1.05-2.63)*
	> 3 meals	38 (73.08)	14 (26.92)	2.51 (1.3-4.86)*
Late-night eating	No	138 (53.91)	118 (46.09)	1
	Yes	108 (63.53)	62 (36.47)	1.48 (1.00-2.21)*
Self-perception	Thin	69 (56.1)	54 (43.9)	1.29 (0.82-2.04)
	Balanced	90 (49.72)	91 (50.28)	1
	Overweight	87 (71.31)	35 (28.69)	2.51 (1.54-4.09)*
Concern about excess fat/body shape	Rarely	66 (41.25)	94 (58.75)	1
	Occasionally	82 (54.3)	69 (45.7)	1.69 (1.08-2.65)*
	Frequently	98 (85.22)	17 (14.78)	8.21 (4.49-15.01)*
Teased or pressured about body shape	Rarely	126 (47.55)	139 (52.45)	1
	Occasionally	96 (72.73)	36 (27.27)	2.94 (1.87-4.63)*
	Frequently	24 (82.76)	5 (17.24)	5.29 (1.96-14.3)*
Thoughts about dieting	Rarely	114 (45.97)	134 (54.03)	1
	Occasionally	81 (66.94)	40 (33.06)	2.38 (1.51-3.75)*
	Frequently	51 (89.47)	6 (10.53)	9.91 (4.13-24.1)*
Stress	Normal	151 (50.17)	150 (49.83)	1
	Mild - Moderate	85 (75.89)	27 (24.11)	3.12 (1.91-5.09)*
	Severe	10 (76.92)	3 (23.08)	3.31 (0.89-12.3)
Anxiety	Normal	79 (41.58)	111 (58.42)	1
	Mild - Moderate	126 (68.11)	59 (31.89)	3.00 (1.96-4.58)*

	Severe	41 (80.39)	10 (19.61)	5.76 (2.72-12.2)*
Depression	Normal	178 (54.6)	148 (45.4)	1
	Mild - Moderate	60 (68.18)	28 (31.82)	1.78 (1.08-2.93)*
	Severe	8 (66.67)	4 (33.33)	1.66 (0.49-5.63)

n = 426, * with p-value < 0.05; OR (Odds Ratio); CI (Confidence Interval)

DISCUSSION

The current study found a significant prevalence of disordered eating behaviors among high school students in suburban Vietnam, with 139/426 (32.62%) scoring ≥20 on the EAT-26 and 207/426 (48.6%) scoring ≥10 on the BITE scale. These results align with global trends indicating substantial rates of ED among adolescents. However, our study's prevalence was higher than in a survey conducted in Jordan, where 40.4% of participants reported disordered eating behaviors, with a higher prevalence among females [6]. The discrepancy may be attributed to differences in assessment tools, cultural influences, and sample characteristics. Furthermore, global variations in ED prevalence reflect complex socio-cultural dynamics, emphasizing the universal nature of ED and the need for tailored interventions [7].

Several factors significantly associated with ED were identified in this study, including irregular meal patterns, body image concerns, and mental health status.

Irregular eating habits emerged as significant risk factors for ED, with participants consuming fewer than three meals per day (OR = 1.67) or more than three meals (OR = 2.51), demonstrating increased vulnerability [8]. These patterns may disrupt metabolic processes and circadian rhythms, as evidenced by a 27-year longitudinal study showing associations between adolescent meal irregularities and the development of metabolic syndrome in adulthood [9]. Additionally, skipping meals can exacerbate anxiety, disrupt hunger cues, and lead to unhealthy food cravings, further increasing the risk of obesity, nutritional deficiencies, and ED.

Body dissatisfaction, identified as a critical predictor of ED, was strongly associated with self-perceptions of being overweight (OR = 2.51) and frequent body shape concerns (OR = 8.21) [10]. These findings align with global evidence linking distorted body image to harmful eating behaviors [11]. In Vietnam, rapid economic development and increasing exposure to Western media ideals may amplify body dissatisfaction, particularly among adolescents. Cultural interventions that address these influences are essential to reducing ED prevalence.

Psychological factors were also significant, with elevated stress, anxiety, and depression levels correlating strongly with ED. Severe anxiety (OR = 5.76) was the most prominent predictor. Adolescents often adopt disordered eating behaviors as coping mechanisms for negative emotions, exacerbating the psychological and physical impacts of ED [12]. This aligns with prior research emphasizing the bidirectional relationship between mental health challenges and ED, underlining the necessity for integrated mental health interventions [13].

Given the high prevalence of ED and their associated factors, comprehensive interventions are urgently needed:

a) Promoting regular eating habits: Educational programs emphasizing the benefits of consistent meal patterns should target adolescents and their families [14]. Addressing socio-economic disparities contributing to irregular eating, such as out-of-home meals among higher-income families, is crucial [15].

b) Addressing body image concerns: Media literacy programs that challenge unrealistic beauty standards can help adolescents build resilience [16]. Family involvement in fostering a positive body image is especially relevant in Vietnamese culture [17].

c) Mental health support: Embedding mental health services within school systems can provide accessible resources for students [18]. Training teachers to identify early signs of psychological distress and establishing referral pathways to mental health professionals are critical steps [19].

This study provides valuable insights into ED prevalence and associated factors among suburban adolescents in Vietnam. Validated tools like EAT-26 and BITE ensure reliable data collection. However, the cross-sectional design limits causal inferences, and reliance on self-reported data introduces potential bias. Additionally, the focus on suburban areas restricts generalizability to urban or rural populations. Future research should employ longitudinal designs and objective measures, such as clinical diagnostics, to understand the temporal dynamics of ED better.

CONCLUSIONS

This study highlights a significant prevalence of disordered eating behaviors among adolescents in suburban Vietnam, strongly linked to irregular meal patterns, body image concerns, and mental health issues. These findings underscore the importance of culturally tailored, multi-pronged interventions to reduce ED burden and improve adolescent health outcomes.

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AUTHOR CONTRIBUTIONS

Anh TH and Truc LTH conceptualized the study, developed the study protocol, and coordinated data collection. Linh ND, Phuong NT, Le NM, and Phuong NM contributed to data acquisition and cleaning. Anh TH, Truc LTH, and Hung LX performed the statistical analyses and interpreted the results. Anh HA, Linh ND, and Hung LX drafted the introduction, methods, and results sections. All authors contributed to writing and revising the discussion. Hung LX critically reviewed and edited the final manuscript. All authors have read and approved the final version of the manuscript.

CONFLICTS OF INTEREST

There is no conflict of interest among the authors.

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