

Effects of examination on perceived stress, eating behaviours and nutritional status

Yu Ni Wong¹, Norliyana Aris^{1,2#}

¹ Nutrition Programme, Faculty of Food Science & Nutrition, Universiti Malaysia Sabah (UMS), Jalan UMS, 88400, Kota Kinabalu, Sabah, MALAYSIA.

² Nutrition in Community Engagement Living Lab (NICE), Faculty of Food Science & Nutrition, Universiti Malaysia Sabah (UMS), Jalan UMS, 88400, Kota Kinabalu, Sabah, MALAYSIA.

Corresponding author. E-Mail: liyana@ums.edu.my; Tel: +6088-320000; Fax: +6088-320259.

ABSTRACT Examinations often lead to changes in university students' perceived stress levels, eating behaviours, and nutritional status. This study aimed to compare these factors between examination and non-examination weeks among Universiti Malaysia Sabah (UMS) students. A cross-sectional study was conducted from July to December 2023. A total of 85 students (40 males and 45 females) were recruited using a non-probability convenient sampling method. Data were collected at two time points (examination and non-examination weeks) using a self-administered questionnaire that included sociodemographic information, perceived stress and the Dutch Eating Behaviours Questionnaire (DEBQ) to measure dietary patterns. Nutritional status was assessed using anthropometry (height and weight) and dietary assessment (two days of 24-hour diet recall). SPSS version 29.0 was used to analyse the data. Findings from Paired sample T-test showed that no significant difference was observed in the perceived stress score between examination and non-examination weeks ($p=0.447$). Additionally, body mass index (BMI) ($p=0.354$), calorie intake ($p=0.392$), and macronutrient intake ($p>0.05$) showed no significant differences between examination and non-examination weeks. In terms of eating behaviours, emotional eating ($p=0.003$) and external eating ($p=0.039$) were significantly higher during examination weeks compared to non-examination weeks. However, no significant changes were found in restrained eating behaviours (0.177). In conclusion, the study found that examinations increased emotional and external eating scores among university students, despite no significant changes in other variables. This could raise university authorities' awareness in guiding students to manage their stress to prevent unhealthy eating behaviours that could jeopardize their health during examination period. Hence, the underlying mechanisms connecting examinations and eating habits should be explored to help students adopt healthier behaviours to manage stress.

KEYWORDS: Perceived stress; Eating behaviours; Nutritional status; Examination; University students

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INTRODUCTION

University students often experience significant stress during examination periods, which can affect their eating behaviours and nutritional status. Academic pressures, competition, and fear of failure contribute to elevated stress levels (Garbóczy *et al.*, 2021). Previous studies have demonstrated a strong link between stress and eating habits, showing that students often adopt irregular eating patterns, consuming low-nutrient foods, or skipping meals, all of which can negatively impact their health (Kabir *et al.*, 2018).

The impact of examinations on students' health extends beyond stress and eating habits to include changes in body composition. Existing studies suggest that some students experience weight fluctuations and changes in body mass index (BMI) during examinations, likely due to increased consumption of sugary foods to cope with the negative effects of mental stress during examinations. These foods, which are high in empty calories, can contribute to body fat and weight gain (Jaremków *et al.*, 2020; Kalkan *et al.*, 2020). However, the evidence remains inconclusive, with some studies suggesting an increase in emotional eating, while others find little change in dietary patterns (Macht *et al.*, 2005; Pollard *et al.*, 1995).

To the best of the researchers' knowledge, there is limited research examining the variations in undergraduates' nutritional status, eating behaviours, and perceptions of stress between examination and non-examination periods. Most studies focus on the association between perceived stress and

factors such as nutritional status and eating behaviours among university students (De Oliveira Penaforte *et al.*, 2016; Cheng & Mohd Kamil, 2020; Ling & Zahry, 2021). Several studies have compared the factors between examination and non-examination weeks, however, studies that explore all the factors together are limited (Pollard *et al.*, 1995; Macht *et al.*, 2005; Ramli *et al.*, 2018; Kalkan *et al.*, 2020; Rabby *et al.*, 2023). Hence, this study aimed to address this gap by comparing the nutritional status, eating behaviours, and perceived stress levels of students at Universiti Malaysia Sabah (UMS) during examination and non-examination weeks. By examining these variables, the study aimed to gain a better understanding of how academic pressures influence students' health and well-being, providing valuable insights into managing stress and promoting healthier eating habits in university settings.

METHODOLOGY

Study Setting, Participants and Sampling

The study was conducted at Universiti Malaysia Sabah (UMS) between July and December 2023, employing a cross-sectional design. It consisted of two phases: Phase one, which covered the examination period (from study week to the end of the final examination s), and Phase two, the non-examination period (at the beginning of semester). The target population included active UMS students aged 18 years and older, proficient in both English and Malay, and free from mental or eating disorders. Participants were selected using non-probability convenience sampling. The study obtained ethical approval from the Medical Research Ethics Committee, UMS [JKETika 3/24 (22)].

Questionnaire

Data were collected using a self-administered questionnaire with five sections, applied consistently in both phases of data collection. Section A collected sociodemographic information, including gender, age, ethnicity, degree year, faculty, examination status, and examination dates (the past 7 days and the coming 7 days). In Section B(i), height (cm) and weight (kg) were measured using a stadiometer (SECA 213) and a bio-impedance analyser (OMRON/HBF-375), respectively. Body Mass Index (BMI) was calculated using the formula: $BMI = \text{weight (kg)} / \text{height (m)}^2$, and classified according to WHO (2010) criteria: underweight (<18.5), normal weight (18.5–24.9), overweight (25.0–29.9), and obese (≥ 30.0). Section B(ii) assessed dietary intake, including calories (kcal), carbohydrates (g), protein (g), and fat (g), using a 24-hour dietary recall method conducted on one weekday and one weekend. Nutrient analysis was performed using the Malaysian Food Composition Database (MyFCD), DietPlus, and the Singapore Energy and Nutrient Composition of Food (ENCF). Section C, the Dutch Eating Behaviour Questionnaire (DEBQ), evaluated three psychological dimensions of eating behaviours (emotional, external, and restrained eating) with 33 items, rated on a 5-item Likert scale. Scores for each subscale were averaged, with the highest score indicating a greater inclination toward that eating behaviour. Section D assessed feelings and thoughts over the past month using a 4-item Likert scale. Items 4, 5, 7, and 8 were reverse-coded before summing. The total score was categorised into low (0–13), moderate (14–26), and high (27–40) to assess perceived stress levels (EAP, 2014).

Statistical analysis

Statistical analysis was conducted using IBM SPSS version 29.0. Descriptive analysis was performed to describe the basic features of the data. Categorical variables are presented as frequency (percentages) while numerical variables are presented as mean and standard deviation (SD) for normal distributed data, or median and inter-quartile range (Q1, Q3) for skewed data. Paired Sample T-tests or Wilcoxon Signed Rank tests were applied to compare the differences in nutritional status, eating behaviour and perceived stress among UMS students between examination and non-examination weeks.

RESULT AND DISCUSSION

A total of 85 students participated in the study, including 40 males and 45 females, with a mean age of 22.25 ± 1.05 years. The majority were Kadazan Dusun (36.5%), from the Faculty of Science and Natural Resources (FSSA) (25.9%), and in their third year (55.3%) (Table 1).

Table 1. Sociodemographic background of study participants.

	Male (n=40)	Female (n=45)	Total (n=85)
Age (year), Mean (SD)	22.23 (1.21)	22.27 (0.89)	22.25 (1.045)
Ethnic			
Kadazan Dusun	18 (45.0)	13 (28.9)	31 (36.5)
Chinese	13 (32.5)	13 (28.9)	26 (30.6)
Malay	2 (5.0)	8 (17.8)	10 (11.8)
Others	7 (17.5)	11 (24.4)	18 (21.1)
Faculty			
FSSA	8 (20.0)	14 (26.7)	22 (25.9)
FKI	12 (30.0)	4 (8.9)	16 (18.8)
FSMP	2 (5.0)	12 (26.7)	14 (16.5)
Others	18 (45.0)	15 (37.7)	33 (38.8)
Degree year			
Year 1	8 (20.0)	8 (17.8)	16 (18.8)
Year 2	8 (20.0)	12 (26.7)	20 (23.5)
Year 3	22 (55.0)	25 (55.6)	47 (55.3)
Year 4	2 (5.0)	0 (0.0)	2 (2.4)

Abbreviation: FSSA, Faculty of Science and Natural Resources; FKI, Faculty of Computing and Informatics & FSMP, Faculty of Food Science & Nutrition. Data were presented as frequencies (percentages).

Table 2 presents the distribution of BMI groups, eating behaviour types, and perceived stress classifications during examination and non-examination periods. Both sexes predominantly reported a normal BMI, a preference for external eating, and moderate stress, which was also the case for the majority of UMS students overall.

Table 2. Distribution of BMI groups, types of eating behaviour, and perceived stress levels.

Variable	Male (n=40)		Female (n=45)		Total (n=85)	
	Examination	Non-examination	Examination	Non-examination	Examination	Non-examination
BMI group						
Underweight	3 (7.5)	3 (7.5)	7 (15.6)	5 (11.1)	10 (11.8)	8 (9.4)
Normal weight	23 (57.5)	23 (57.5)	27 (60.0)	30 (66.7)	50 (58.8)	53 (62.4)
Overweight	12 (30.0)	12 (30.0)	6 (13.3)	5 (11.1)	18 (21.2)	17 (20.0)
Obese	2 (5.0)	2 (5.0)	5 (11.1)	5 (11.1)	7 (8.2)	7 (8.2)
Eating behaviour type						
Emotional	3 (7.5)	3 (7.5)	3 (6.7)	3 (6.7)	6 (7.1)	6 (7.1)
External	29 (72.5)	27 (67.5)	34 (75.6)	28 (62.2)	63 (74.1)	55 (64.7)
Restrained	8 (20.0)	10 (25.0)	8 (17.8)	14 (31.1)	16 (18.8)	24 (28.2)
Perceived stress level						
Low	2 (5.0)	5 (12.5)	4 (8.9)	4 (8.9)	6 (7.1)	9 (10.6)
Moderate	32 (80.0)	30 (75.0)	34 (75.6)	38 (84.4)	66 (77.6)	68 (80.0)
High	6 (15.0)	5 (12.5)	7 (15.6)	3 (6.7)	13 (15.3)	8 (9.4)

Data were presented as frequency (percentage).

This study found no significant differences in anthropometric measurements between examination and non-examination weeks, contradicting previous report by Jaremków *et al.* (2020). This may be due to the small sample size and short study duration, which limited generalisability and prevented the

detection of noticeable changes. Jaremków *et al.* (2020) suggested that declines in weight and BMI during examinations were linked to rigorous studying, which weakened health and led to unfavourable changes in body composition. They also found that most medical students in Wrocław, Poland, had healthy weights and normal BMIs, with both male and female students showing lower weight and height during the examination period compared to the start of the semester. However, only the changes in female students were statistically significant ($p < 0.05$). Contrary to the current findings, Tayyem *et al.* (2013) found that both male and female students in Jordan gained significant weight during examinations compared to non-examination periods. They attributed this to students viewing physical activity as a waste of time and not recognising its role in reducing examination stress, leading to an energy imbalance and weight gain.

The present findings revealed that university students' dietary habits were minimally influenced by examinations, likely because most of them were in their third year and had adjusted to the high-pressure setting, making them more resilient to examination stress. Similarly, Pollard *et al.* (1995) found no notable differences in food intake between examination and non-examination periods, regardless of gender. Additionally, Kalkan *et al.* (2020) observed a slight increase in energy and carbohydrate intake, along with a decrease in protein and fat consumption during examination times, however, these changes were not statistically significant ($p > 0.05$). Researchers suggested that most students showed no changes in appetite during examinations, likely due to their dietary resilience (Barker *et al.*, 2015).

Based on the results, Benbaibeche *et al.* (2023) proposed that emotional and external eating tend to manifest simultaneously. Compared to males, females often experience greater stress and negative emotions due to their pessimistic characteristics, leading to a higher tendency to practice emotional eating during examination season (Graves *et al.*, 2021). Researchers have suggested that females often use emotion-focused stress-coping strategies, such as emotional eating, during stressful events like examinations. They are also more prone to external eating, responding to external cues like appealing and palatable food (Graves *et al.*, 2021; Mohammad Radzi *et al.*, 2022).

Meanwhile, the significant increase in emotional and external eating scores during the examination period may be attributed to the function of food as a comforting tool to overcome stress and elevate mood. Hence, emotional eating is often used as a coping mechanism during examinations (Mohammad Radzi *et al.*, 2022; Abdurrahman *et al.*, 2022). Additionally, the convenience of food delivery apps with appealing options may have promoted external eating (Mohammad Radzi *et al.*, 2022; Benbaibeche *et al.*, 2023). In contrast, Costarelli and Patsai (2012) found that Greek female undergraduates had the highest external eating scores in both examination and relaxed periods, with no statistically significant differences between the two ($p > 0.05$).

According to the current results, Alduraywish *et al.* (2023) suggested that the decrease in university students' perceived stress levels as they progress through their academic years and the negligible differences among them were likely due to better adaptation, gained experience, and effective coping mechanisms for examination-related stress. In contrast, Kumari *et al.* (2021) found a significant difference between pre-midterm and post-midterm examinations, with perceived stress scores among college students being significantly lower after the midterm examination ($p < 0.05$). Additionally, Kalkan *et al.* (2020) found continuous stress during examinations, substantially higher than non-examination periods ($p < 0.05$). According to several studies, factors contributing to significant increased stress include fear of poor grades, lack of examination preparation, high parental expectations, and peer competition (Mofatteh, 2021). These disruptions can trigger stress responses like anxiety, excessive concern, intense nervousness, and overthinking during examinations (Luckmizankari, 2017). The whole finding in this study is summarized in Table 3.

Table 3. Comparison of nutritional status, eating behaviour, and perceived stress during examination and non-examination weeks.

Variable	Male (n=40)			Female (n=45)			Total (n=85)		
	Examination	Non-examination	<i>p</i> -value	Examination	Non-examination	<i>p</i> -value	Examination	Non-examination	<i>p</i> -value
Anthropometry									
Weight (km)	68.5 (11.9)	70.8 (19.1)	0.329	54.8 (11.0)	56.6 (18.0)	0.278	61.3 (13.3)	63.3 (19.7)	0.146
Height (cm)	170.1 (6.5)	170.2 (6.7)	0.428	155.5 (5.7)	155.5 (5.6)	0.498	162.4 (9.5)	162.4 (9.6)	0.293
BMI (kg/m ²)	23.7 (3.9)	23.7 (3.8)	0.767	22.7 (4.8)	22.9 (4.8)	0.240	23.2 (4.4)	23.3 (4.4)	0.354
Dietary intake									
Calorie (kcal)	2050.5 (1539.4, 2598.2)	2048.8 (1626.0, 2648.1)	0.767	1675.8 (1371.9, 2242.2)	1682.1 (1382.7, 2151.6)	0.318	1837.1 (1445.2, 2474.1)	1805.5 (1437.3, 2312.3)	0.392
Carbs (g)	276.8 (196.4, 371.4)	286.5 (211.5, 322.2)	0.638	227.7 (172.8, 301.9)	235.3 (174.4, 297.1)	0.924	236.7 (78.9, 708.38)	249.2 (194.1, 311.9)	0.777
Protein (g)	74.3 (59.8, 95.3)	74.2 (60.1, 101.7)	0.717	59.8 (48.3, 83.3)	59.1 (43.3, 70.8)	0.200	67.7 (53.1, 89.4)	64.4 (49.7, 84.7)	0.278
Fat (g)	65.9 (51.5, 75.9)	74.8 (45.2, 98.6)	0.132	63.4 (40.7, 91.3)	53.9 (39.6, 73.7)	0.085	65.6 (46.9, 78.4)	62.3 (42.5, 79.9)	0.764
Eating behaviour									
Emotional	2.3 (0.6)	2.1 (0.7)	0.119	2.5 (0.6)	2.2 (0.8)	0.013	2.4 (0.6)	2.2 (0.7)	0.003
External	3.2 (0.5)	3.2 (0.6)	0.604	3.4 (0.5)	3.3 (0.5)	0.015	3.3 (0.5)	3.2 (0.5)	0.039
Restrained	2.5 (0.8)	2.5 (0.8)	0.921	2.6 (0.9)	2.7 (0.8)	0.073	2.5 (0.8)	2.6 (0.8)	0.177
Perceived stress	20.9 (4.8)	20.0 (5.1)	0.122	20.3 (5.5)	20.5 (4.6)	0.747	20.6 (5.2)	20.3 (4.9)	0.477

Data were presented as mean (standard deviation) and median (Q1 and Q3). Data in bold denotes a significant *p*-value.

CONCLUSION

The study found no significant differences in nutritional status (anthropometry and dietary intake) and perceived stress levels among UMS students during examination and non-examination weeks. However, significant differences in eating behaviours were observed. The minor differences could be attributed to adaptation mechanisms and the quick recovery from stressful situations as the academic year progresses, while the considerable difference in eating behaviour could be explained by the role of emotional or external eating as one of the coping mechanisms for students to overcome stress during the examination season. Therefore, university authorities should consider implementing stress management programs that support students during stressful periods such as peer support groups, counselling and mental health services, and physical activity programs. To improve this study, the residential and financial status of students need to be assessed, as they are the potential confounders that impact the stress levels. Besides, under- and over-reporting of energy intake needs to be ruled out to avoid biased data reporting.

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