CLASSIFICATION OF KUWAIT UNIVERSITY STUDENTS CONSIDERING BULIMIA NERVOSA PATTERNS USING HIERARCHICAL CLUSTER ANALYSIS

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ABSTRACT

The study aimed to classify Kuwait University students with bulimia nervosa using hierarchical cluster analysis. The study adopted the exploratory analytical approach, applying it to (n = 382) male and female students. A bulimia nervosa scale was used, which supported five main dimensions through an exploratory factor analysis. The results of the study revealed that the general level of bulimia nervosa among Kuwait University students was low (M = 1.82, SD = 0.499). The results of the cluster analysis confirmed the presence of three bulimia nervosa clusters. The first cluster represented 43.2% of the sample and was characterized by low scores on all dimensions of the bulimia nervosa scale. The second cluster represented 27.2% of the sample and was characterized by preoccupation with body image, weight, and unhealthy compensatory behaviors. The third cluster, which constituted 29.6% of the sample, was characterized by an average score on the dimensions of the bulimia nervosa scale. The results of the chi-square test confirmed that demographic characteristics (gender, major, age) did not reveal any differences between the three discovered clusters.

1. INTRODUCTION

Eating disorders are health problems that negatively impact mental and physical health. Bulimia nervosa is one such disorder, characterized by recurrent overeating, followed by inappropriate compensatory behaviors to prevent weight gain (Jain & Yilanli, 2023). Recent literature indicates that bulimia nervosa is one of the most prevalent disorders among young adults and adolescents, with higher rates among adolescent girls. The prevalence rate is twice as high among females (1.6%) compared to males (0.8%) (Feixas et al., 2010; Harrington et al., 2015; NIMH, 2025). It is estimate that approximately 70 million people worldwide, of various genders, ages, and ethnic backgrounds, suffer from various eating disorders (Ceccarini et al., 2022). Twin and family studies also suggest that these disorders have a genetic basis (Watson et al., 2021). Bulimia nervosa is a form of eating disorder characterized by intense food cravings, followed by repetitive and inappropriate compensatory behaviors to control weight. These behaviors include going to the bathroom immediately after and during meals to eliminate food, completely emptying the stomach, the use of laxatives, diuretics, or stimulants, in addition to following strict diets, fasting for extended periods, and sometimes excessive exercise (Hay & Claudino, 2010; DSM-5, 2013; Mohajan & Mohajan, 2023).

The study of bulimia nervosa is gaining importance in the university setting due to the high prevalence of eating disorders among university students (Eisenberg et al., 2011). This period is also considered a stage of vulnerability to weight gain, putting those affected at risk of obesity (Delinsky & Wilson, 2008). Furthermore, exposure to academic and social pressures related to body image and weight increases the likelihood of students experiencing binge eating as an emotional or compensatory behavior among university students (Tavolacci et al., 2020; Diaz Muñoz, 2021; Strete et al., 2025). Schaumberg, (2014) conducted a study on university students indicated the prevalence of compensatory behaviors to control weight gain among both genders. This highlights the need to examine clusters of bulimia nervosa among university students to understand the underlying behaviors and encourage the development of preventive programs.

The cognitive-behavioral theory of bulimia nervosa focuses on the processes that maintain this disorder, including a dysfunctional self-evaluation system. People with eating disorders evaluate themselves primarily by their eating habits, shape, or weight, and their ability to control them. This leads to a focus on controlling diet, being thin, and losing weight, while avoiding overeating, obesity, and weight gain. The core of bulimia nervosa is primarily responsible for this over-evaluation of eating, shape, and weight control (American Psychiatric Association, 1994; Fairburn et al., 2003).

Other clinical features stem from this psychopathological core, including excessive weight control behavior, body surveillance, avoidance, and preoccupation with thoughts about eating, shape, and weight. The only feature that does not directly reflect the psychopathological core is "binge eating," which is largely a product of the way patients attempt to restrict their eating. The psychopathological core is reinforced by patients' compensatory "purging," which may undermine their belief in the ability of purging to reduce weight gain. In addition, patients with eating disorders tend to be highly self-critical, setting strict standards regarding their food intake, body shape, and weight, leading to secondary negative self-evaluation (Fairburn et al., 1993; Vitousek & Brown, 2015).

In this context, classifying university students using hierarchical cluster analysis for the bulimia nervosa variable would be beneficial for educational and psychological research. This clustering is used to create homogeneous groups with similar characteristics, allowing for the identification of more severe groups (such as those who binge eat or use laxatives) and less severe groups. Munguía et al. (2022) study using cluster analysis in eating disorders demonstrated the ability to classify certain subgroups, which contributed to a better understanding of the different clusters of individuals with the disorder. This study will then contribute to designing classifications among university students with this disorder, allowing for the development of preventive methods for the study sample, and therapeutic interventions according to the characteristics of each group.

Finally, despite the global interest in eating disorders, there is a need to investigate the classification of university students according to bulimia nervosa clusters using hierarchical cluster analysis. This is due to the scarcity of studies that include a classification framework for the bulimia nervosa variable in the Arab context, particularly in the Gulf countries. Recent epidemiological studies indicate that between 23.8% and 34.8% of individuals in the Arab world are at risk of developing an eating disorder (Melisse et al., 2024), highlighting the need for further study. Hence, this study aims to classify Kuwait University students according to bulimia

nervosa clusters using hierarchical cluster analysis. This will contribute to bridging this research gap and providing scientific findings that can be used in designing preventive and therapeutic programs that are compatible with the environmental context in general. Specifically, this study aims at tackling the following questions

1. How many distinct clusters can be extracted through hierarchical cluster analysis of bulimia nervosa dimensions among Kuwait University students?
2. Do these clusters differ in demographic characteristics (gender, major, age)?

2. MATERIALS AND METHODS

2.1. Research Design

A descriptive and analytical design was employed to achieve the study's objectives. This design aimed to identify clusters that could be extracted from a hierarchical cluster analysis of the dimensions of bulimia nervosa among Kuwait University students, as well as their psychological and behavioral characteristics. It also sought to identify the extent to which these clusters differed in their demographic characteristics, and which clusters were most susceptible to psychological aspects related to bulimia nervosa.

2.2. Research Sample

The study sample consisted of Kuwait University students selected using a convenience sampling method during the academic year 2024–2025. The total sample included 382 students, including 174 males (45.5%) and 208 females (54.5%). The participants' ages ranged between (17-35) years (M = 20.54, SD = 1.97). Most participants were between (17 - 20) years old (53.9%), followed by the age group between (21 - 25) years old (43.7%), and then the age group between (26 - 30) years old (1.6%). The lowest percentage of participants was between (31 - 35) years old (0.8%). In terms of specialization, most participants were from literary specializations (n = 257, 67.3%), while 125 participants (32.7%) were from scientific specializations, Table 1.

Table 1: Demographic Characteristics of the Sample Participants.

Characteristics		n (382)	%
Gender	*Male*	174	45.5
	Female	208	54.5
Age	*17 - 20*	206	53.9
	21 - 25	167	43.7
	26 - 30	6	1.6
	31 - 35	3	0.8
Major	*Science*	125	32.7
	Art	257	67.3
Total		**382**	**100%**

2.3. Data Collection and Analysis

The study relied on a bulimia nervosa scale consisting of (31) items, designed in accordance with previous literature in the field of study. The scale was answered using a five-point Likert scale (5). The instrument was presented to three referees from Kuwait University faculty members (College of Education and College of Social Sciences), and the agreement rate among them was higher than (85%), indicating the apparent validity of the instrument.

The validity and reliability of the instrument were measured by calculating the correlation coefficients between each item and the total score of the scale, which ranged from 0.22 to 0.74 (p < 0.01). The value of Cronbach's alpha coefficient reached (0.89), which is a high value above the acceptable threshold of (0.70).

To confirm the factorial structure of the instrument, exploratory factor analysis was used to verify its structural validity. The results showed that the KMO value (0.885) is greater than the acceptable threshold (> 0.50), indicating the reliability of the factors obtained from the factor analysis and the adequacy of the sample size used in the study. Bartlett's Test also showed statistical significance (χ^2 = 4853.030, p < .001), indicating that the relationship is statistically significant and that there is a correlation between the variables, indicating the feasibility of conducting factor analysis on the data, Table 2.

The Eigenvalues results also showed that there are seven main factors exceeding the value of (1). We found that all of them explained approximately (59.96%) of the total variance of the data, a percentage exceeding 50%, indicating the strength of the factor model.

The first factor accounted for the largest percentage of explained variance (27.26%), followed by the second factor (8.15%), the third factor (7.76%), the fourth factor (5.66%), and the fifth, sixth, and seventh factors (3.84%, 3.66%, and 3.59%), respectively, Table 3, Figure 1.

The results of the loading matrix showed that all items are distributed among seven factors; the values of the saturation coefficients ranged between (0.31) and (0.94), and all of them exceeded the minimum (0.40), except for some items that will be deleted.

This indicates that there is a strong correlation between the items and the latent factors, Table 4. The structure matrix also showed that the seven factors are related to each other, as the values of the inter-correlation coefficients ranged between (0.29) and (0.52), indicating that the dimensions are interconnected, Table 5.

2.3.1. Factor 1: Binge Eating Behaviors

This dimension included items (q8, q30, q9, q28, q25, q3, q4, q2, q11, q6) that showed saturation coefficients (0.34 - 0.84). Item (q11) had a low saturation (0.34), and item (q6) was interconnected with Factor 1 (0.49) and Factor 7 (0.56). However, the remaining items clearly reflect poor control over the amount of food consumed, which is consistent with previous literature that binge eating is the most dominant dimension in eating disorders (Fairburn, 2008).

2.3.2. Factor 2: Preoccupation with Weight and Body Image

This dimension included items (q14, q15, q5, q16, q13, q24) with saturations ranging from 0.58 to 0.93. This dimension reflects excessive thinking and fear of gaining weight, consistent with previous evidence that eating disorders are closely related to an individual's assessment of their body image and weight (Bianchi et al., 2023).

2.3.3. Factor 3: Compensatory Behaviors

This dimension consisted of items (q29, q26, q27, q31, q17), which explained a large portion of the variance (saturations ranging from 0.68 to 0.84. These results indicate that the use of compensatory methods to control weight gain, such as self-induced vomiting or laxatives, is a key dimension in the diagnosis of bulimia nervosa (American Psychiatric Association, 2013).

2.3.4. Factor 4: Self-Control/Restraint

This factor included items (q1, q12, q11) with a high factor weight (0.47-0.82), and item (q11) achieved double saturation between the first factor (0.34) and the fourth factor (0.47).

This factor reflects the behavior of individuals with bulimia nervosa who attempt to control their eating behavior by abstaining from eating or imposing some restrictions to avoid weight gain. This is also consistent with previous literature that excessive control and exaggerated discipline lead to bulimia nervosa (Abdoli et al., 2025).

2.3.5. Factor 5: Negative Practices

This factor also included items (q20, q10, and q21) with a high factor weight (0.63–0.79), indicating that engaging in certain negative practices to lose weight is a mediating factor between feelings of psychological stress and binge eating (Guo et al., 2025).

2.3.6. Factor 6: Eating-Related Stress

Items (q19, q7, q22) included items (q22) and (q22) showed a low saturation (0.37). These items reflect the pressures an individual experiences regarding food and eating behaviors, and those emotions play a significant role in eating disorders (Arnow et al., 1995).

2.3.7. Factor 7: Excessive Exercise

This dimension consisted of (q18, q6) where (q18) achieved strong saturation (0.66), while (q6) showed cross-saturation with the first factor (0.49) and the seventh factor (0.56). This dimension reflects the individuals' adoption of some compensatory methods such as excessive physical activity and food refusal to control body weight. This is also consistent with previous literature that this is one of the compensatory symptoms of bulimia nervosa (Fairburn, 2008).

Although exploratory factor analysis initially extracted seven factors, several items showed low or cross-loadings (q11, q22, q23) and were removed. The final structure returned to the original design of five dimensions: (1) Binge/Emotional Eating (8 items), (2) Preoccupation with Weight and Body Image (6 items), (3) Unhealthy Compensatory Behaviors (7 items), (4) Guilt & Depression (4 items), and (5) Disorganized/Negative Eating Practices (3 items). The final version of the instrument therefore consisted of 28 items across five dimensions. The scale was developed by the researcher based on previous literature (Fairburn, 2008; Alexander et al., 2013; Bianchi et al., 2023).

From the above, the previous results confirm that the instrument has a strong factorial structure, enhancing its validity as a tool used to measure the dimensions of bulimia nervosa among Kuwait University students. This is consistent with previous literature (Fairburn, 2008; Alexander et al., 2013) that eating disorders are not unidimensional, but rather multidimensional, encompassing multiple cognitive, behavioral, and emotional dimensions.

The extraction of seven factors is also consistent with theoretical frameworks that emphasize the fact that eating disorders involve several behaviors, including compulsive eating, compensatory control, body image, stress, and others.

Table 2: KMO and Bartlett's Test.

KMO	Bartlett's Test		
0.89	Chi - Square	df	Sig
	4853.03	465	0.000

Table 3: Total Variance Explained.

Component	Eigenvalue	% of Variance	Cumulative %
1	8.452	27.264	27.264
2	2.528	8.154	35.419
3	2.408	7.768	43.186
4	1.757	5.668	48.854
5	1.192	3.846	52.700
6	1.137	3.666	56.366
7	1.115	3.595	59.961

Table 4: Summary of Pattern Matrix.

N	Component	Items	Saturation level
1	Binge Eating Behaviors	q8, q30, q9, q28, q25, q3, q4, q2, q11, q6	0.34 – 0.84
2	Preoccupation with Weight and Body Image	q14, q15, q5, q16, q13, q24	0.58 – 0.93
3	Compensatory Behaviors	q29, q26, q27, q31, q17	0.68 – 0.84
4	Self-Control/Restraint	q1, q12, q11	0.47 – 0.82
5	Negative Practices	q20, q10, q21	0.63 – 0.79
6	Eating-Related Stress	q19, q7, q22	0.37 – 0.79
7	Excessive Exercise	q18, q6	0.55 – 0.66

Table 5: Component Correlation Matrix.

Component	1	2	3	4	5	6	7
1	1.000	.525	.362	.470	.298	.045	-.173
2	.525	1.000	.291	.265	.341	.070	-.157
3	.362	.291	1.000	.186	.244	.089	-.152
4	.470	.265	.186	1.000	.154	-.038	-.137
5	.298	.341	.244	.154	1.000	.116	-.126
6	.045	.070	.089	-.038	.116	1.000	.044
7	-.173	-.157	-.152	-.137	-.126	.044	1.000

Table 5: Summary of Pattern Matrix after Deletion.

N	Component	Items	Saturation level
1	Binge/Emotional Eating	q8, q30, q9, q28, q25, q3, q4, q2	.52 – .84
2	Preoccupation with Weight & Body Image	q14, q15, q5, q16, q13, q24	.58 – .94
3	Unhealthy Compensatory Behaviors	q29, q26, q27, q31, q17, q18, q6	.56– .84
4	Guilt & Depression	q1, q12, q19, q7	.54 – .82
5	Disorganized/Negative Eating Practices	q20, q10, q21	.63 – .79
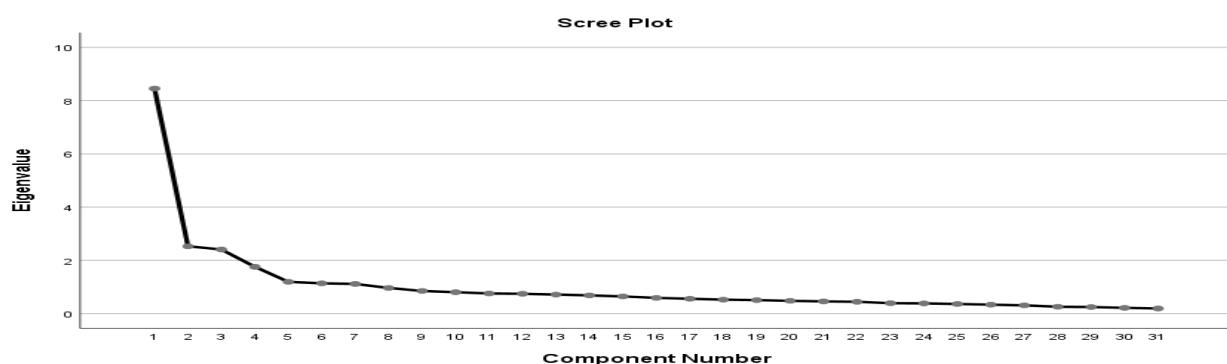
Figure 1: Shows The Scree Plot, The Latent Root Values For Each Factor.

3. RESULTS

The current study aimed to "classify Kuwait

University students in light of bulimia nervosa clusters using hierarchical cluster analysis." The study used the Kolmogorov-Smirnov test to verify the normality of the distribution of the bulimia nervosa scale dimensions. It was found that all five dimensions follow a non-normal distribution, as the (p < .001). Therefore, non-parametric statistics will be relied upon in analyzing the data, Table 6.

Descriptive statistics were conducted for the scale and its dimensions, and the results showed a decrease in the general level of bulimia nervosa among Kuwait University students with a mean (M = 1.82, SD = 0.499). The mean values of the scale dimensions ranged (1.12 – 2.14). Preoccupation with Weight & Body Image ranked highest (M = 2.14, SD = 1.021), followed by Unhealthy Compensatory Behaviors (M = 2.04, SD = 0.635), Binge/Emotional Eating (M = 1.90, SD = 0.717), Guilt & Depression (M = 1.45, SD = 0.626), and Disorganized/Negative Eating Practices (M = 1.12, SD = 0.330), Table 7.

Cluster analysis techniques using Ward's Method and Euclidean Distance were used to identify the number of latent clusters that could be extracted for bulimia nervosa among Kuwait University students. Examination of the dendrogram and aggregation table revealed a clear separation at the three-group level, indicating the suitability of the triadic solution. Accordingly, three clusters were retained: Cluster 1 (n = 165; 43.2%), Cluster 2 (n = 104; 27.2%), and Cluster 3 (n = 113; 29.6%).

To verify the three clusters, the analysis was repeated using K-Means with k = 3. K-Means revealed a convergent distribution, confirming the presence of three clusters (Cluster 1 = 212, Cluster 2 = 44, Cluster 3 = 126). The final cluster centers also showed significant differences across all dimensions.

To further validate the clustering, Ward's classification was compared with K-Means classification (table below). The results showed a strong correlation between the two classifications (χ^2 (df = 4) = 313.886, p < .001); the effect size was large (Cramer's V = 0.641), and moderate agreement according to the Kappa measure (Cohen's Kappa = 0.560, p < .001). These results reflect a clear convergence in the cluster structure and thus support the three-cluster distribution.

To explore the distinct psychological and behavioral characteristics of each cluster, the Kruskal–Wallis test was used to test for differences between groups due to the non-normal distribution. The results revealed statistically significant differences between the three clusters across the five dimensions of the Bulimia Nervosa Scale. The Kruskal–Wallis test values for the first dimension were (χ^2 108.519, p < .001), the second dimension (χ^2 304.560, p < .001), the third dimension (χ^2 45.541, p < .001), the fourth dimension (χ^2 63.774, p < .001), and the fifth dimension (χ^2 37.882, p < .001).

Cluster 1 was characterized by low bulimia nervosa behaviors; the group had the lowest average scores on the bulimia nervosa dimensions (D1 = 1.53, D2 = 1.22, D3 = 1.88, D4 = 1.20, D5 = 1.03), reflecting that this cluster was characterized by low bulimia nervosa behaviors and possessed normal characteristics and was less prone to developing bulimia nervosa. Cluster 2 had the highest mean scores on the bulimia nervosa dimensions compared to Cluster 1 and 3. Cluster 2 had a high score on the weight and body image preoccupation dimension (M = 3.42), a medium score on the binge/emotional eating dimension (M = 2.51) and compensatory behaviors dimension (M = 2.48), and a low score on the guilt dimension (M = 1.83) and negative eating practices dimension (M = 1.27). These results indicate that individuals with this cluster suffer from a preoccupation with body image and weight, and they also engage in some compensatory and unhealthy behaviors to avoid gaining weight. Therefore, this cluster is considered more susceptible to bulimia nervosa symptoms than the other two clusters. While Cluster 3 was in the middle of the two clusters, obtaining low scores on average on the dimensions of bulimia nervosa, but higher than Cluster 1 and lower than Cluster 2, as follows: (D1 = 1.89, D2 = 2.14, D3 = 2.04, D4 = 1.44, D5 = 1.1213), Table 8.

The chi-square test was used to detect differences between the discovered clusters in demographic characteristics (gender, major, age). The results showed no differences between the three discovered clusters in age (χ^2 (df = 28) = 30.799, *p* = 0.326). No statistically significant differences were also observed between the discovered clusters in academic specialization (scientific/literary) (χ^2 (df = 2) = 0.079, *p* = 0.961) or gender (χ^2 (df = 2) = 4.442, *p* = 0.108). These results confirm that the demographic characteristics (gender, major, age) did not reveal any distinction between the three discovered clusters. It is worth noting that although the percentage of female students was higher in Cluster 1 (60.6%) compared to the second (50.0%) and third (49.6%), these differences were not statistically significant. Similarly, in the scientific and literary disciplines, the percentages were close to each other between the three clusters. This suggests that eating disorders may be prevalent among both genders and different age groups without discrimination, Table 9.

Table 6: Kolmogorov-Smirnov Test.

	Kolmogorov-Smirnov		
	Statistic	df	Sig.
D1	.141	382	.000
D2	.132	382	.000
D3	.143	382	.000
D4	.266	382	.000
D5	.455	382	.000

Table 7: Descriptive Statistics for Scale Dimensions.

	Dimensions	Mean	S. D	Level	Rank
1	Binge/Emotional Eating	1.90	0.717	low	3
2	Preoccupation with Weight & Body Image	2.14	1.021	low	1
3	Unhealthy Compensatory Behaviors	2.04	0.635	low	2
4	Guilt & Depression	1.45	0.626	very low	4
5	Disorganized/Negative Eating Practices	1.12	0.330	very low	5
	Overall Questionnaire	**1.82**	**0.499**	**low**	

Table 8: Mean Scores (And SD) For the Three Clusters of Kuwaiti Students (N = 382).

N	Dimension	Cluster 1 (n=165, 43.2%)	Cluster 2 (n=104, 27.2%)	Cluster 3 (n=113, 29.6%)	χ^2 (df=2)	p-value
1	Binge Eating	1.53 (0.37)	2.51 (0.92)	1.86 (0.47)	108.52	<.001
2	Body Image Preoccupation	1.22 (0.29)	3.43 (0.67)	2.29 (0.45)	304.56	<.001
3	Compensatory Behaviors	1.88 (0.50)	2.48 (0.81)	1.87 (0.40)	45.54	<.001
4	Restraint	1.20 (0.37)	1.83 (0.83)	1.44 (0.51)	63.77	<.001
5	Negative Practices	1.03 (0.14)	1.27 (0.51)	1.10 (0.26)	37.88	<.001

Table 9: Differences Between-Cluster Across Demographic Variables.

Variable	Cluster 1 vs 2	Cluster 1 vs 3	Cluster 2 vs 3
Gender	χ^2 (df = 2) = 4.44, p = .108	χ^2 (df = 2) = 4.44, p = .108	χ^2 (df = 2) = 4.44, p = .108
Male (%)	39.4 – 50.0	39.4 – 50.4	50.0 – 50.4
Female (%)	60.6 – 50.0	60.6 – 49.6	50.0 – 49.6
Major	χ^2 (df =2) = 0.079, p = .961	χ^2 (df = 2) = 0.079, p = .961	χ^2 (df = 2) = 0.079, p = .961
Science (%)	32.7 – 33.7	32.7 – 31.9	33.7 – 31.9
Arts (%)	67.3 – 66.3	67.3 – 68.1	66.3 – 68.1
Age	χ^2 (df = 28) = 30.799, p = .326	χ^2 (df = 28) = 30.799, p = .326	χ^2 (df = 28) = 30.799, p = .326
Age groups (peak %)	Cluster 1: 20–21y (≈53%)	Cluster 1: 20–21y vs Cluster 3: 20–21y	Cluster 2: 19–21y vs Cluster 3: 20–21y

4. DISCUSSION

The study aimed to classify Kuwait University students according to their bulimia nervosa clusters using hierarchical cluster analysis. The study results revealed that the overall level of bulimia nervosa among Kuwait University students was low (M = 1.82, SD = 0.499). This result is consistent with the findings of studies (Melisse et al. 2020; Safiri et al. 2022; Albrahim et al. 2022; Alsheweir et al. 2023; Melisse et al. 2024) that the prevalence of eating disorders and bulimia nervosa is lower in Arab environments, but it is present among some groups and manifests in the form of different eating behaviors and preoccupation with body image.

Through a descriptive analysis of the data, the results revealed that the weight and body image dimension (M = 2.14) ranked first compared to the other dimensions of the scale. This is consistent with several studies (Stice 2001; McKnight Investigators 2003; Perkins & Brausch 2019; Yasmine 2025) that individuals' preoccupation with body image is considered one of the early beginnings of bulimia nervosa and represents the most influential dimension of bulimia nervosa. The third dimension, unhealthy compensatory behaviors (M = 2.04), came in second place, which is consistent with what some studies have confirmed (Colleen Stiles-Shields 2012; Bruening & Perez 2019; Keel & Forney 2019) that bulimia nervosa is not limited to binge eating but is also followed by some unhealthy compensatory behaviors such as deliberate purging, laxative use, and excessive exercise. The guilt and depression dimensions (M = 1.45) and disordered eating practices (M = 1.12) also had the lowest mean scores. This confirms that university students in Kuwait suffer from some pressures related to body image and fear of excess weight compared to other dimensions of the scale (Al-Kharinj & Al-Maasab 2011; Musaiger & Al-Mannai 2013; El-Sabban et al. 2016; Ebrahim et al. 2019). The results of the cluster analysis confirmed the presence of three bulimia nervosa clusters. The first cluster, representing 43.2% of the sample, was characterized by low scores on all dimensions of the bulimia nervosa scale. This confirms that this cluster was characterized by a normal level and is the least likely to develop bulimia nervosa. Some studies (Wonderlich et al. 2005; Touchette et al. 2011; Peschel et al. 2024) have labeled this cluster as a subclinical category, as individuals in this cluster may exhibit some unhealthy eating behaviors, but they do not reach the level of bulimia nervosa. Cluster 2 (27.2%) of the sample was characterized by preoccupation with body image and weight, scoring moderately on the Bulimia Nervosa scale, and engaging in unhealthy compensatory behaviors. According to previous literature (Wonderlich et al. 2005; Derks et al. 2022; Eck & Byrd-

Bredbenner 2021; Peschel et al. 2024), this cluster is more prone to self-harming behaviors such as laxative use, compulsive vomiting, or excessive exercise, which increases their likelihood of developing bulimia nervosa. As for the third cluster, which constituted (29.6%) of the sample size, it was characterized by an average degree in the dimensions of the bulimia nervosa scale, and it obtained the rank between the first cluster (non-clinical category) and the second cluster (highest category), so it is average in symptoms, which do not reach the diagnosis of bulimia nervosa (Stice & Fairburn 2003; Wonderlich et al. 2005; Piontkowski 2014). These results confirm that bulimia nervosa is not a homogeneous entity, but rather consists of a group of clusters that differ in severity and distinguishing characteristics. This is consistent with previous evidence (Hay & Fairburn, 1996; Wonderlich et al., 2005; Stice et al., 2006) that eating disorders are multidimensional constructs, which enhances the validity of cluster analysis to understand inter-individual differences. The study's findings of three main clusters of bulimia nervosa among Kuwait University students are consistent with what was confirmed by previous literature (Hay & Fairburn, 1996; Wonderlich et al., 2005; Stice et al., 2006), which identified three to four main clusters of bulimia nervosa. The results of the chi-square test confirmed no statistically significant differences among the three clusters identified in terms of age (χ^2 (df = 28) = 30.799, p = 0.326). No statistically significant differences were also observed among them in terms of academic specialization (scientific/literary) (χ^2 (df = 2) = 0.079, p = 0.961) or gender (χ^2 (df = 2) = 4.442, p = 0.108). These results confirm that demographic characteristics (gender, specialty, age) did not reveal any significant differences between the three detected clusters. The theoretical contribution of this study lies in its discovery of three clusters of bulimia nervosa, which supports theories that view bulimia nervosa as multi-faceted rather than homogeneous. Furthermore, the identified dimensions of bulimia nervosa, in terms of body image, weight, and unhealthy compensatory behaviors, support the basic dimensions of bulimia nervosa, which have been confirmed in previous literature to explain this disorder. These two dimensions are primary indicators of individuals at greater risk for developing this disorder. The results of this study are also consistent with psychological theories that emphasize that the psychological dimension does not solely underlie bulimia nervosa, but rather that there is a complex interplay between psychological, behavioral, and emotional factors. The practical contribution lies in raising awareness among university students, particularly those in Kuwaiti society, about body image and the risks associated with compensatory behaviors, particularly in the high-risk cluster. Universities should establish counseling and preventative units within campuses to detect these symptoms before they appear, and work to provide the necessary psychological support and counseling to limit the emergence of eating disorders.

5. CONCLUSION

The study analyzed clusters of bulimia nervosa among Kuwait University students using hierarchical cluster analysis. The results revealed a low prevalence of bulimia nervosa among Kuwait University students, with the highest prevalence of weight and body image preoccupation and unhealthy compensatory behaviors. The cluster analysis identified three distinct clusters: a low-symptom cluster (43.2%), a high-risk cluster characterized by body image concerns and compensatory behaviors (27.2%), and a moderate-risk cluster with moderate levels (29.6%). The theoretical contribution of the study is the identification of three clusters of bulimia nervosa, supporting theories that consider it a multifaceted, rather than homogeneous, disorder. Practically speaking, the study highlights the need for universities to implement preventive and counseling programs to identify students most at risk for this disorder early and provide the necessary psychological support. There are some limitations to this study, including its application to a single university (Kuwait University), which limits the generalizability of the results. It also relies on a cross-sectional design and subjective measures without the use of any clinical diagnostic tools. In conclusion, the study emphasizes the importance of early intervention in eating disorders among university students, and future research should replicate the findings by applying them to other institutions and relying on different methodological designs.

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