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Eating Disorders among Students in Northern Benin (2023)

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Abstract

Introduction: From their earliest hours, human beings are able to identify a source of food and to feed themselves. Feeding is therefore one of the most instinctive human functions. It is regulated by several factors (physiological, psycho-affective and environmental) whose disruption can lead to eating disorders. **Objective:** The aim of this study was to investigate eating disorders among students in the town of Parakou in 2023. **Method:** Descriptive cross-sectional study conducted from January to July 2023 in various universities in the city of Parakou, Benin. The study population consisted of all students in grades 1 to 7 at these universities. A two-stage non-proportional stratified sampling technique combined with a simple random draw was adopted. The Eating Attitude Test-26, Bulimia Inventory Test Edinburgh and a set of questions focusing on the diagnostic criteria for pica were used to screen for pica and other disorders such as anorexia, bulimia nervosa and binge eating disorder. Data were analyzed using SPSS (Statistical Package for Social Sciences) version 25. **Results:** A total of 607 students were surveyed, 323 of whom had eating disorders. A prevalence of 53.21% of students at risk of eating disorders was found. In relation to the total population, the prevalences of anorexia, bulimia nervosa, binge eating disorder and pica were 45.96%, 0.82%, 15.48% and 12.68% respectively. In multivariate analysis, seven factors explained the risk to develop at least one eating disorder among the students surveyed. These were: urban area of residence (OR (95% CI) = 5.059 (1.75 - 14.65); p = 0.003); year of study (OR (95% CI) = 0.47 (0.28 - 0.79); p = 0.035); type of university attended (private university: OR (95% CI)

= 1.63 (1.08 - 2.44); p = 0.019); parents' marital status (couple or not) (OR (95% CI) = 1.50 (1.01 - 2.24); p = 0.046); father's level of education: secondary (OR (CI 95%) = 3.85 (1.96 - 7.54); p < 0.001)/higher (OR (CI 95%) = 2.83 (1.36 - 5.86); p = 0.005); mother's one: secondary (OR (CI 95%) = 0.30 (0.18 - 0.51); p < 0.001)/superior (OR (CI 95%) = 0.31 (0.16 - 0.61); p = 0.001); the presence of doubtful (OR (CI95% = 1.69 (1.11 - 2.58); p = 0.009) or certain anxiety symptomatology (OR (CI 95%) = 1.69 (1.11 - 2.58); p = 0.009). **Conclusion:** More than half the students in Parakou had at least one eating disorder. Diagnostic studies are needed, even if preventive actions are already necessary.

Keywords

Eating Disorders, Benin, 2023

1. Introduction

Eating is a vital behavior. From the very first hours of life, human beings are able to identify a source of food and to feed themselves. Feeding is therefore one of the most instinctive human functions. It is regulated by several factors (physiological, psycho-affective and environmental) whose their disruption can lead to eating disorders [1]. According to the Diagnostic Statistical Manual of Mental Disorders, 5th version (DSM-V), eating disorders are characterized by "persistent disturbances in eating or eating behavior resulting in pathological eating patterns or food intake deleterious to physical health or social functioning".

The DSM-V classification identifies the following eating disorders: anorexia nervosa and bulimia nervosa, binge eating disorder, pica, merychism, specified or unspecified eating or food intake disorders, restriction or avoidance of food intake [2].

In 2019, the World Health Organization (WHO) estimated that 14 million people had an eating disorder, including almost 3 million children and adolescents [3]. Prevalence studies carried out in Asia, North America and Europe reported varying prevalences, ranging from 2.2% to 4.6% [4]. According to the same study, the prevalence of eating disorders was 8.4% in women and 2.2% in men [4]. In France in 2020, Tavolacci *et al.* found a prevalence of 24.8% [5]. In Egypt and Bangladesh, Eladawi *et al.* and Pengpid *et al.* reported proportions of 65% and 37.6% respectively [6] [7]. In sub-Saharan Africa, a screening study conducted by Aina *et al.* in Nigeria in 2016 reported that 15.3% of students were at risk of eating disorders [8]. In recent decades, these disorders have expanded considerably, particularly in non-Western cultures, due to increased urbanization and globalization [9].

Some studies report significant nutritional and psychological disturbances, with a major impact on quality of life. Indeed, around 15% of sufferers die from malnutrition, and the risk of suicide is multiplied by 22 [10].

According to some preconceived ideas, in Africa, eating disorders are perceived as culture-related and limited to the Western world [8]. However, recent studies suggest the emergence of these disorders in non-Western countries [11]. In order to provide epidemiological data in Benin, the present study, initiated as part of a doctoral thesis in general medicine, set out to investigate eating disorders, in particular: anorexia, bulimia nervosa, pica and bulimic hyperphagia among students in the country's second university town, Parakou.

2. Study Framework and Methods

This was a descriptive, analytic, cross-sectional study conducted from January to July 2023 in various universities in the city of Parakou. The study population consisted of all 1st to 7th year students at various universities in the city of Parakou. The minimum sample size for this work was determined using Schwartz's formula, based on a study carried out by Aina *et al.* [8] in Nigeria in 2016, in which the prevalence of eating disorders among students was 15.3%. The minimum sample size was 219 students. A two-stage non-proportional stratified sampling technique, combined with a simple random draw, was adopted.

1st level: random selection of establishments

Initially, two strata were created. One stratum comprised the public universities and the other the approved private universities in the commune of Parakou. As the University of Parakou is the only public university in the town, it was selected from the outset. The four private universities were selected at random by drawing lots.

2nd stage: choice of students surveyed

At the University of Parakou, accidental or convenience sampling was used to select students who met the inclusion criteria. The same method was used for private universities.

2.1. Measurements

Data were collected using a digitized questionnaire and a pre-test was carried out on other targets in order to correct any errors and clarify ambiguous questions.

The dependent variable in this study was the risk of at least one eating disorder. It was assessed using several scales: the "EAT: Eating Attitudes Test-26", the "Bulimic Investigatory Test Edinburgh: BITE" and the "HAD: Hospital Anxiety and Depression scale".

- Eating Attitudes Test-26.

The EAT-26 questionnaire was developed in 1979 by Garner *et al.* It is a screening tool for measuring the frequency of attitudes and behaviours characteristic of anorexia nervosa, with a short administration time of around two minutes. Initially in English, it was translated into French before validation by Leichner *et al.* in 1994. The questionnaire comprises 26 items. Each item was rated in terms of frequency of behavior or thought, from "always" to "never". A

total score of 20 or more indicates the presence of anorexia nervosa attitudes [12].

➢ Bulimic Investigatory Test Edinburgh: BITE.

The BITE questionnaire was created in 1987 by Henderson and Freeman. It's a 30-item self-administered questionnaire for screening for bulimia nervosa and binge eating disorder. Only the original English version is validated. Nevertheless, it has been translated into French and used by many authors in their studies. It is short and simple to use, and has good reliability and validity for assessing bulimic behaviors, including patients with both bulimia nervosa and binge eating disorder [13].

- Score < 10: Eating behavior within the norm.
- Score between 10 and 19: Eating frenzy to be investigated.
- Score ≥ 20: high probability of bulimia [13].

In the absence of a pica screening scale, a mini-questionnaire consisting of 04 questions, including two main questions with binary responses, was drawn up on the basis of the DSM-V diagnostic criteria for pica. A "yes" answer to any of these questions would indicate a positive screen for pica.

➢ Hospital Anxiety and Depression scale: HAD scale

This is a screening instrument for anxiety and depressive disorders. It was developed by Phillip Snaith and Anthony Zigmond in 1983 and translated in 1985 by JP Lépine *et al.* It comprises 14 items rated from 0 to 3. It takes between 2 and 6 minutes to complete. Seven questions relate to anxiety (total A) and seven to depression (total D), giving two scores (maximum score for each = 21). To screen for anxiety and depressive symptoms, the following interpretation was adopted for each of the scores (A and D) [14].

- 7 or less: no symptoms;
- 8 to 10: doubtful symptomatology;
- 11 and over: definite symptomatology [14].

2.2. Analysis

Data analysis was performed using SPSS version 25 software. Qualitative variables were described using percentages with their confidence intervals, and quantitative variables using average and standard deviation or median and interquartile ranges, depending on the type of data. Frequency comparisons were made using Chi2 tests (Pearson, Yates or Fisher as appropriate), and a p-value < 0.05 was considered significant.

3. Ethical Considerations

As a first step, an opinion was sought from the ethics committee. Authorization for the survey was obtained from the dean's office of the University of Parakou. Secondly, authorization was obtained from the departmental health directorate. Participants gave their agreement to the informed consent form which contained detailed information on the conduct of the study. Finally, all data were analyzed

in full confidentiality and anonymity.

4. Results

A total of 607 students meeting the inclusion criteria were surveyed.

4.1. Socio-Demographic Characteristics

The extremes of age were 16 and 34 years. The average age was 21.21 ± 2.24 years in the general student population and 21.15 ± 2.79 years in the population of students at risk of eating disorders.

The age group most represented in both the general population and the population of students at risk of eating disorders was the 18 - 24 age group, with proportions of 84% and 85.45% respectively (Table 1).

In the general population, the majority of respondents (55.52%) were male compared with 44.42% who were female. Meanwhile, in the population of participants at risk of eating disorders, 54.49% were male versus 45.51% female, giving a sex ratio of 1.97 (Table 1).

Table 1. Distribution of surveyed population by socio-demographic characteristics (Parakou, 2023).

	Sample (N = 607)	Absence of eating disorders (n = 284)	Presence of eating disorders (n = 323)
Age			
[16 - 18 [years	25 (04.10%)	13 (04.58%)	12 (03.72%)
[18 - 24] years	510 (84.00%)	234 (82.39%)	276 (85.45%)
25 years and +	72 (11.90%)	37 (13.03%)	35 (10.84%)
Gender			
Male	337 (55.52%)	161 (56.69%)	176 (54.49%)
Female	270 (44.48%)	123 (43.31%)	147 (45.41%)
Marital status			
Single	513 (84.51%)	235 (82.75%)	278 (86.07%)
In a relationship	74 (12.19%)	39 (13.73%)	35 (10.84%)
Cohabiting	12 (01.98%)	5 (00.76%)	7 (02.17%)
Married	6 (00.99%)	4 (01.41%)	2 (00.62%)
Divorced	2 (00.33%)	1 (00.35%)	1 (00.31%)
Place of residence			
Urban	581 (95.72%)	279 (98.24%)	302 (93.50%)
Rural	26 (04.28%)	5 (01.76%)	21 (06.50%)
Type of university attented			
Public	453 (74.63%)	224 (78.87%)	229 (70.90%)
Private	154 (25.37%)	60 (21.13%)	94 (29.10%)

4.2. Personal History of Students Surveyed

Among the general population of respondents, 20 (3.29%) had suffered from a mental illness at least once and 28 (4.61%) had undergone surgery at least once. Slightly more than a third 222 (36.57%) of respondents used psychoactive substances: alcohol was consumed by 213 students (35.09%), tobacco by 7 (1.15%) and only 2 (0.33%) claimed to use drugs (cannabis and others). In terms of criminal record, 03 students (0.49%) claimed to have had trouble with the Law (Table 2).

Of the students at risk of eating disorders, 12 (3.72%) had a psychiatric history and only 3 of them (0.93%) had received psychiatric or psychological treatment. Similarly, 12 (3.72%) of the subjects had undergone surgery at least once. One person (0.31%) reported having had problems with the Law. As for the use of psychoactive substances, there were 119 of them, *i.e.*, more than a third (36.84%) (Table 2).

4.3. Students' Family History

Of those surveyed, 43 (7.08%) had at least one relative suffering from a mental pathology. In the group of students at risk of eating disorders, a slightly higher proportion (8.98%) had a family history of mental illness.

4.4. Biographical Characteristics

4.4.1. Parents' Level of Education

Generally speaking, most of the students' parents had attained secondary education (37.07% of fathers and 32.62% of mothers). In contrast, 138 fathers (42.72%)

Table 2. Distribution of surveyed population by personal history (Parakou, 2023).

	Sample (N = 607)	Absence of eating disorders (n = 284)	Presence of eating disorders (n = 323)
Psychiatric history			
No	587 (96.71%)	276 (97.18%)	311 (96.28%)
Yes	20 (03.29%)	8 (02.82%)	12 (03.72%)
Surgical history			
No	579 (95.39%)	268 (94.37%)	311 (96.28%)
Yes	28 (04.61%)	16 (05.63%)	12 (03.72%)
Addiction history			
Alcohol	213 (35.09%)	100 (35.21%)	113 (34.98%)
Tobacco	7 (01.15%)	2 (00.70%)	5 (01.55%)
Cannabis	2 (00.33%)	1 (00.35%)	1 (00.31%)
Criminal record			
No	604 (99.51%)	282 (99.30%)	322 (99.69%)
Yes	3 (00.49%)	2 (00.70%)	1 (00.31%)

and 43 mothers (32.20%) of students at risk of an eating disorder had respectively a secondary school education and no education at all.

4.4.2. Family Type and Parental Behavior towards Respondents

372 (61.12%) of the students surveyed and 191 (59.13%) of the subjects at risk of an eating disorder came from monogamous families, and the majority of parents/guardians behaved normally towards them

4.4.3. Parental Cohabitation and Cohabitation with Parents

In the general population, 453 (74.63%) of the students' both parents were still living together, and 150 (24.71%) of these students were still living at home. However, among subjects at risk of an eating disorder, the majority of both parents 232 (71.83%) were still living together and 238 (73.68%) of these subjects were no longer living with both parents (Table 3).

Table 3. Distribution of respondents by biographical characteristics (Parakou, 2023)

	Sample (N = 607)	Absence of eating disorders (n = 284)	Presence of eating disorders (n = 323)
Family type			
Monogamous	371 (61.12%)	180 (63.38%)	191 (59.13%)
Polygamous	236 (38.88%)	104 (36.62%)	132 (40.87%)
Parents' behavior			
Balanced	483 (79.57%)	227 (79.93%)	256 (79.26%)
Lax	114 (18.78%)	54 (19.01%)	60 (18.58%)
Violent	10 (01.65%)	3 (01.06%)	7 (02.17%)
Parents living together			
Yes	453 (74.63%)	221 (77.82%)	232 (71.83%)
No	154 (25.37%)	63 (22.18%)	91 (28.17%)
Live with parents			
No	457 (75.29%)	219 (77.11%)	238 (73.68%)
Yes	150 (24.71%)	65 (22.89%)	85 (26.32%)
Father's level of education			
Secondary	225 (37.07%)	87 (30.63%)	138 (42.72%)
University	220 (36.24%)	114 (40.14%)	106 (32.82%)
Primary	97 (15.98%)	47 (16.55%)	50 (15.48%)
None	65 (10.71%)	36 (12.68%)	29 (08.98%)
Mother's level of education			
Secondary	168 (27.68%)	64 (22.54%)	104 (32.20%)
University	198 (32.62%)	109 (38.38%)	89 (27.55%)
Primary	142 (23.39%)	55 (19.37%)	87 (26.93%)
None	99 (16.31%)	56 (19.72%)	43 (13.31%)

4.5. Means of Controlling Weight and Body Mass Index

In the general population, 206 students (33.94%) used strategies to control their weight, the most common being sport (25.54%). Among those at risk of eating disorders, 120 (37.15%) used weight-control methods, with sport also the main method.

In terms of body mass index (BMI), the average BMI in the general population was 21.56 ± 2.53 kg/m^2, with extremes of 14.69 and 40.17 kg/m^2. Subjects at risk of at least one binge-eating disorder had an average BMI of 21.44 ± 3.72 kg/m^2, with extremes of 15.24 and 40.17 kg/m^2 (Table 4).

4.6. Description of the Study Population According to Anxiety and Depression

According to the HAD scale, 22.90% had doubtful symptoms of anxiety disorders, and 14.17% had definite symptoms. Depressive symptomatology was doubtful for 12.32% of students and certain for 4.45%.

Among students at risk of at least one eating disorder, 26.01% had doubtful anxiety symptomatology and 16.72% had definite symptomatology. Similarly, 14.55% had questionable symptomatology for depression and 4.64% had definite symptomatology (Figure 1).

In this Figure 1: the blue bar represents students with no symptoms of anxiety or depressive disorders; the red bar represents students with doubtful symptomatology for anxiety and depressive disorders; the green bar represents students with definite symptoms of anxiety and depressive disorders.

Table 4. Distribution of survey population according to body mass index BMI and weight control methods used (Parakou, 2023).

	Sample (N = 607)	Absence of eating disorders (n = 284)	Presence of eating disorders (n = 323)
Body mass index (kg/m^2)			
<18.5	58 (09.55%)	16 (05.63%)	42 (13.00%)
[18.5 - 24.99]	479 (78.91%)	241 (84.86%)	238 (73.68%)
[25 - 29.99]	62 (10.21%)	24 (08.45%)	38 (11.76%)
≥ 30	8 (01.31%)	3 (01.06%)	5 (01.55%)
Weight control			
No	401 (66.06%)	198 (69.72%)	203 (62.85%)
Yes	206 (33.94%)	86 (30.28%)	120 (37.15%)
Weight management			
Sport	155 (54.58%)	64 (22.54%)	91 (28.17%)
Fasting	41 (14.44%)	21 (07.39%)	20 (06.19%)
Laxatives	3 (01.06%)	-	3 (00.93%)
Appetite suppressants	3 (01.06%)	-	3 (00.93%)
Other medications	3 (01.06%)	-	3 (00.93%)

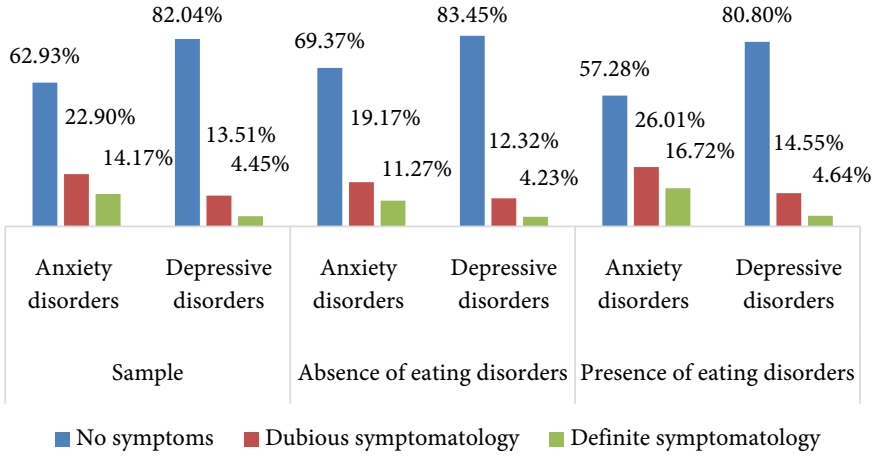

Figure 1. Description of survey population according to the existence of anxiety and depression (Parakou, 2023).

4.7. Prevalence of Eating Disorders among University Students in Parakou in 2023

Among the cohort of 607 students surveyed, 323 individuals with at least one eating disorder were identified. The prevalence of eating disorders among these students was 53.21%.

Among these 323 at-risk students, data on the numbers and frequencies of each disorder investigated were as follows: 234 (86.37%) presented with anorexia nervosa, 94 (29.1%) with binge eating disorder, 77 (23.83%) with pica, and 5 (1.54%) with bulimia nervosa (**Figure 2**).

In relation to the total population surveyed (N = 607), the proportions of each of these disorders were as follows: anorexia nervosa (45.96%), bulimia nervosa (15.48%), pica (12.68%), and bulimia nervosa (0.82%) (**Figure 3**).

4.8. Search for Statistically Significant Associations between the Risk of at Least One Eating Disorder and Other Variables in Bivariate Analysis

In bivariate analysis, the following variables showed a statistically significant association with the risk of at least one eating disorder: place of residence ($p = 0.004$), religion ($p = 0.018$), type of university attended ($p = 0.024$), body mass index BMI ($p = 0.005$), weight control strategies ($p = 0.046$), anxiety ($p = 0.008$) and parents' educational level (father's educational level: $p = 0.017$; mother's educational level: $p = 0.001$).

4.9. Multivariate Analysis of Factors Associated with the Risk of at Least One Eating Disorder

In multivariate analysis, the factors associated with the existence of at least one eating disorder were: urban residence (OR (95% CI) = 5.059 (1.75 - 14.65); $p = 0.003$); year of study (OR (95% CI) = 0.47 (0.28 - 0.79); $p = 0.035$); type of university attended (private university: OR (95% CI) = 1.63 (1.08 - 2.44); $p = 0.019$);

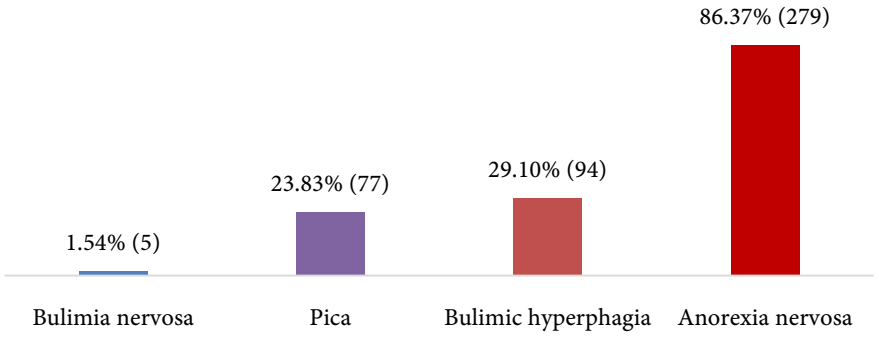

Figure 2. Distribution of the prevalence of the various eating disorders investigated among university students compared to the general population (Parakou, 2023).

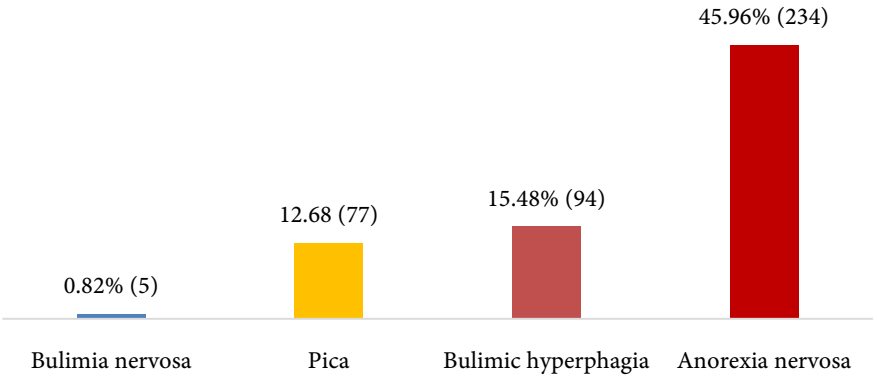

Figure 3. Distribution of the prevalence of the various eating disorders detected among students compared to the total population (Parakou, 2023).

parents' marital status (parents in couple or not) (OR (95% CI) = 1.50 (1.01 - 2.24); p = 0.046); father's level of education: secondary (OR (CI 95%) = 3.85 (1.96 - 7.54); p < 0.001)/higher (OR (CI 95%) = 2.83 (1.36 - 5.86); p = 0.005); mother's: secondary (OR (CI 95%) = 0.30 (0.18 - 0.51); p < 0.001)/superior (OR (CI 95%) = 0.31 (0.16 - 0.61); p = 0.001); the presence of doubtful (OR (CI95% = 1.69 (1.11 - 2.58); p = 0.009) or definite (OR (CI 95%) = 1.89 (1.13 - 3.18); p = 0.009) anxiety symptomatology (Table 5).

5. Discussion

5.1. Socio-Demographic Characteristics

Age

The average age of the students was 21.21 ± 2.24 years. This average is comparable to the 20.73 years found by Chan *et al.* in Malaysia in 2020 [15] and the 21.38 years reported by Aina *et al.* in Nigeria in 2016 [8], and higher than the 18.7 years in the study conducted by De Matos *et al.* in Brazil in 2020 [16], as well as the 16.05 years of Sabry *et al.* in Egypt in 2020 [17]. On the other hand, Loni *et al.* in Saudi Arabia and dos Reis *et al.* in Brazil in 2014 [18] found a higher median age (23.5 years ± 1.8 years and 23.4 years ± 6.13 years respectively). These results may be explained by the disparity between the study populations.

Table 5. Factors associated in multivariate analysis with the risk of eating disorders among students (Parakou, 2023).

	OR (Odds Ratio)	(IC95%)	p-value
Place of residence			
Rural	1	-	-
Urban	5.059	(1.75 - 14.65)	***0.003***
Year of study			**-**
Grade 1	1		
Grade 2	0.76	(0.49 - 1.18)	0.224
Grade 3	0.47	(0.28 - 0.79)	***0.005***
Grade 4	0.64	(0.34 - 1.21)	0.170
Grade 5	1.68	(0.82 - 3.45)	0.157
Grade 6	0.00		0.999
Grade 7	0.76	(0.26 - 2.25)	0.619
Type of university attended			
Public	1	-	-
Private	1.63	(1.08 - 2.44)	***0.019***
Parents living together			
No	1	-	-
Yes	1.50	(1.01 - 2.24)	***0.046***
Father's education			**0.001**
No education	1	-	-
Primary	1.87	(0.91 - 3.84)	0.086
Secondary	3.85	(1.96 - 7.54)	***<0.001***
Higher	2.83	(1.36 - 5.86)	0.005
Mother's level of education			**<0.001**
No education	1	-	-
Primary	0.68	(0.40 - 1.15)	0.152
Secondary	0.30	(0.18 - 0.51)	***<0.001***
Higher	0.31	(0.16 - 0.61)	***0.001***
Anxiety disorders according to HAD			**0.009**
No symptoms	1	-	-
Doubtful symptomatology	1.69	(1.11 - 2.58)	***0.015***
Definite symptomatology	1.89	(1.13 - 3.18)	***0.015***

Indeed, De Matos *et al.* conducted a study exclusively among 1st-year students, while Sabry *et al.* targeted secondary school pupils.

Gender

The male gender was predominant in this work. Indeed, 55.52% of respon-

dents were male, compared with 44.42% who were female. This male-dominated distribution reflects the unequal gender distribution within Benin's universities. In fact, during the 2020-2021 academic year, only 30.2% of students were female, compared with almost 70% male. A similar distribution was found by Fadipe *et al.* in Nigeria in 2017 (55.6%) [19], and Pengpid *et al.* in Bangladesh in 2015 (56.6%) [6].

On the other hand, Tavolacci *et al.* in France in 2020 (36.6% men) [5], Tayfur *et al.* in Turkey in 2020 (26.6% men) and dos Reis *et al.* in Brazil in 2014 [18] (23.0% men), found a preponderance of women. These differences can be explained by the specific demographic characteristics of each of these areas.

5.2. Personal and Family History

Around one in thirty of the students surveyed had a personal history of mental illness, and 4.61% had a history of surgery. On the other hand, very few revealed any criminal record. The fact that mental illness is attributed to supernatural forces and that the stigma associated with it is a reason for low attendance at treatment centers, could explain this rate. According to a study conducted by Tognon *et al.* in Benin in 2020, 54.22% of adults in northern Benin had a mental disorder [20].

Regarding the use of psychoactive substances, this study revealed that alcohol was the most widely consumed (35.09%), followed by tobacco (1.15%) and drugs (0.33%). According to the results of the WHO's "STEPSwise" surveys, carried out in Benin in 2015, 30% of men aged 18 to 29 consumed alcohol. As for drug use, 1.97 of students surveyed had used cannabis and 19.1% reported having taken methamphetamines or amphetamines at least once in their lives according to Tee *et al.* in Benin in 2022 [21]. These proportions are much lower than those reported by De Matos *et al.* in Brazil in 2020 [16]. According to this study, 13.8% of students smoked and 59% drank alcohol [16]. On the other hand, drug use was found among 3.1% of students in the survey carried out by Tavolacci *et al.* in France in 2020 [5]. This discrepancy in results reflects the high prevalence of psychoactive substance use among Western students.

5.3. Biographical Characteristics

Most of the respondents' parents had attended school up to secondary level. However, there were more educated fathers than mothers (10.71% versus 27.68%). These figures are significantly higher than those found by Alwosaifer *et al.* in Saudi Arabia in 2018 (1.1% vs. 2.9%) [22]. This difference reflects the literacy rate in Benin, which according to the UNESCO Institute for Statistics will stand at just 46% in 2021, much lower than the 99% found by the same institution in Saudi Arabia in 2020.

The majority of those surveyed came from monogamous families (61.12%). Indeed, according to the fifth Benin Demographic and Health Survey (EDSB-V), 62% of women aged 15 to 49 were in monogamous unions and 38% were in po-

lygamous unions. A similar trend was found by Aina *et al.* in Nigeria in 2016, but with a higher proportion 84% [8].

5.4. Anxiety and Depression

Very few respondents in this study showed symptoms of depression (4.45%). Anxiety was found in 14.17% of participants. In a study carried out in a rural community in northern Benin, Tognon *et al.* reported a prevalence of 32.34% for major depressive episode and 9.62% for generalized anxiety.

Other authors have found prevalences similar to those in this study. These include Tavolacci *et al.* in France in 2020, who reported a prevalence of depression and anxiety of 3.3% and 15.5% respectively [5]. However, higher values were noted by De Matos *et al.* in Brazil in 2020 (35.2% and 46.8% respectively for depression and anxiety) [16]. The use of different diagnostic scales may explain this wide disparity in results. In the present study, the HAD scale was used to diagnose depression and anxiety, while Tavolacci *et al.* used the Perceived Stress Scale (PSS-10) and the Beck Depression Inventory to diagnose anxiety and depression respectively.

5.5. Weight Control Methods and BMI

In this study, 33.94% of students used weight control methods. Of these, the most commonly used was sport, followed by fasting. Very few used laxatives, appetite suppressants or other medications for this purpose. This proportion is higher than that reported by Attouche *et al.* in Morocco in 2021 (24.7%), and Eya *et al.* in Tunisia in 2022 (18%) [23], but much lower than the 65% found by Charfi *et al.* in Tunisia in 2015 [24]. The predominant means varied from adopting a diet (Attouche *et al.*; Eya *et al.*) to voluntarily skipping meals (Charfi *et al.*).

With regard to Body Mass Index (BMI), in the general population, students had an average BMI of 21.56 ± 2.53 kg/m^2, with extremes of 14.69 and 40.17 kg/m^2. A normal BMI was found in 78.91% of students, 10.21% were overweight, 9.55% were thin, while only 1.31% were obese. According to the results of surveys on risk factors for non-communicable diseases using the WHO's "STEPS-wise" approach, carried out in Benin in 2015, 75.5% of subjects aged between 18 and 29 had a normal BMI. A similar average was found by Aina *et al.* in Nigeria in 2016 [8]. Similarly, they report a similar predominance of students with a normal BMI in the same proportions (72.5%). Other authors, including Chan *et al.* in Malaysia in 2020 (46.7%), and El-Bagoury *et al.* in Egypt in 2017 (50.8%) [25], noted this predominance, but with lower proportions. This could be explained by the different geographical and socio-cultural contexts of the samples studied.

5.6. Prevalence of Students Testing Positive for at Least One Eating Disorder

At the end of the present study, 53.21% of students had tested positive for at

least one eating disorder. This relatively high prevalence may be explained by the number of disorders studied at the same time. The prevalences found by the various authors vary. This great variability may be attributable to the psychometric instruments used, the methodology, and the characteristics of the sample studied.

5.7. Factors Associated with Eating Disorders in Multivariate Analysis

After multivariate analysis, the factors associated with the risk of presenting at least one eating disorder among students in the town of Parakou were: urban residence, type of university attended, parents' marital status, father's level of education, mother's level of education, presence of doubtful or definite anxiety symptoms.

Several authors have reported significant associations between living environment and eating disorders. In this study, urban living environment showed an association with the presence of eating disorders. A similar association was found by Bilali *et al.* in Greece in 2010 and by Kilani in Jordan in 2017 [26], whose results suggested that students in urban areas were at significantly higher risk of developing an eating disorder than students in rural areas.

In Italy and the Netherlands, Preti *et al.* [27] and Hoek *et al.* reported that bulimia nervosa was more frequently observed in urban populations than in rural or suburban populations [28]. Similarly, in Japan, Kuboki *et al.* noted that subjects living in urban areas had a higher prevalence of anorexia nervosa [29]. These disparities could be explained by the distinct lifestyles observed within urban populations, as well as the diverse social, environmental, economic and cultural contexts that characterize them.

The marital status of the respondents' parents was found to be a risk factor for eating disorders. Indeed, the risk of developing at least one eating disorder is multiplied by 1.5 in students whose parents live together, compared with those whose parents live apart. Other authors have established this relationship. Doksat *et al.* in Turkey in 2017 had reported a relationship between adolescent girls at risk of eating disorders and parental marital status [30]. However, in contrast to the results of this work, the parents' divorced status was the one incriminated.

Fadipe *et al.* in Nigeria in 2017 found a link between anxiety and the risk of eating disorders [19]. Safi *et al.* in Tunisia in 2022 [23], and Charfi *et al.* in Tunisia in 2015 [24], reported a similar association. This association could be explained by the fact that the experience of anxiety makes the individual more vulnerable to the development of eating disorders, on the one hand, and by the coping strategy or even the protective and defensive mechanism against anxiety that eating disorders could represent, on the other. Furthermore, as with anxiety, some authors (Attouche *et al.*, Tavolacci *et al.* [5]) have shown a significant association between depression and eating disorders, but in the present series, only anxiety showed such an association.

5.8. Study Limitations

In this study, the non-probability sampling method was used for convenience. The sample size was calculated using Schwartz's formula, based on the average prevalence found in Nigeria, a sub-Saharan African country bordering Benin Republic. The minimum sample size was 219, but in the end 607 subjects were surveyed. Recognized and validated scales: the Eating Attitudes Test-26 and Bulimia Inventory Test Edinburgh were used to screen for anorexia nervosa, bulimic hyperphagia and bulimia nervosa. For the screening of pica, a questionnaire based on the DSM-V diagnostic criteria was used.

Despite the strengths of this study, some of its limitations and biases should be noted. The study was based primarily on the subjective statements of the subjects. These were a function of the subjects' understanding of the theme and the various questions on the scales used. This aspect of the work raises the problem of the possible over- or under-estimation of questions by certain targets, even though the explanations provided by the interviewers helped to reduce this bias.

The other aspect is that of the scales themselves. Developed for the most part by English-speaking authors, then translated into French, they all originate from Western civilizations. None of them have been validated in an African context, and are therefore not adapted to the continent's socio-cultural realities. Nor can these scales be used to establish a precise medical diagnosis, but rather as initial screening methods. Studies should be carried out to provide African authors with screening scales specific to African realities.

6. Conclusions

The main eating disorders explored were anorexia and bulimia nervosa, binge eating and pica. The results showed a fairly high prevalence, with one student in two at risk of at least one of the eating disorders. Anorexia nervosa was the most common, followed by bulimia nervosa, pica and bulimia nervosa, which was virtually non-existent. In multivariate analysis, multiple factors were associated with the risk of eating disorders. These included urban residence, year of study, type of university attended, parents' marital status, father's level of education (secondary or higher), mother's level of education (secondary or higher), and the presence of doubtful or definite anxiety symptomatology.

These data show that, despite African delusional beliefs, eating disorders do exist on the continent and merit further investigation.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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