dissatisfaction with body image 62% in Europe [8], 48.1% in Malaysia [9], 51% in Iran [10], and 73.6% in Saudi Arabia [11]. In Nigeria, a survey reported a prevalence of 82.9% body image dissatisfaction among public and private school students in Benin, Edo state [12].

Adolescents especially girls have concerns about weight, body shape and self-image with many being dissatisfied with their body size and weight because slimness is seen as the desirable and beauty standard. Studies have shown that females usually express greater body dissatisfaction than males [13]. Poor body image perceptions can cause low self-esteem and self-confidence [14].

Some studies show that individuals who are overweight or obese are usually dissatisfied with their body image while some others have reported that the level of body image dissatisfaction is high even among those with normal body mass index values [15,16].

Obesity has been identified as one of the rising epidemics across the globe with consequential rise of non-communicable diseases incurring disproportionate health care cost on individuals, family and society. According to the latest WHO estimates, the worldwide prevalence of obesity nearly tripled between (1975 and 2016) 39% of adults (39% of men and 40% of women) were overweight in 2016, while about 13% of the world's adult population (11% of men and 15% of women) were obese. Over 340 million children and adolescents aged 5-19 were overweight or obese in 2016 [17].

The transition from adolescence to adulthood is an important period for establishing behavioral patterns that affect long-term health and chronic disease risk [18]. Young adults who previously had little or no control over their food choices shift to having prime control over what, when and how they want to eat. Many individuals develop habits that are harmful to their health such as drinking excessive amounts of alcohol and eating unhealthily during young adulthood [19].

Apart from dietary patterns changing, young adults tend to be concerned about their physical appearance and how to change or maintain it for various reasons including appealing to romantic partners, fitting into certain peer groups or simply gaining confidence in them [20].

Body dissatisfaction among young adults influences weight control behaviors. Moreover, university undergraduates are identified as one of the population affected by body image related issues, including body image dissatisfaction as they tend to be more concerned with their body image because of their environment [21].

Three decades ago, Nigerian university students were satisfied with their body parts [22]. However, recent studies have reported a high prevalence of body dissatisfaction and probable psychiatric morbidity among secondary school learners, with the majority (87.4%) having incorrectly perceived their actual body size [23]. In addition, there is a high prevalence of weight misperceptions and a lack of implementing weight control practices among adults in Northern Nigeria [24]. Exploring perceptions of individuals' weight status and relating this perception to the real weight can help in determining the unrealistic views of body image [25]. Studies conducted among undergraduates in Abia and Edo States reported that 26.7% of students did not have an accurate perception of their body weight and the prevalence of body shape dissatisfaction was high [26], however, none of the published studies determined the relationship between body image perception, nutritional status and weight control strategies among university undergraduates. This study therefore determined the relationships between body image perception, nutritional status and weight control strategies among university undergraduates in Lagos.

Materials and Methods

The present A cross sectional study was conducted among university undergraduate students in Lagos, Nigeria. The minimum sample size calculated using the Cochran's formula ($n_o = Z^2pq/e^2$) was 470 however, 865 participants were recruited for the study. A multistage random sampling technique was used for the study. The first stage was selection of two Universities by balloting (University of Lagos and Lagos State University) from the three universities in Lagos State. At stage 2, four (4) faculties were selected from the twelve faculties in each university using simple random sampling technique (balloting) to get eight faculties. At stage 3, three departments were selected using simple random sampling technique (balloting) from each faculty to make twenty-four departments. At stage 4, a level was selected from each department using simple random sampling technique to obtain twenty-four classes. At the last stage, a systematic random sampling method was used to select at least thirty-three students from each class using the class list as the sampling frame. The class list was obtained, and the sample size needed from each class was used to divide the class list in order to determine the sampling interval in each class. Students were then recruited based on the sample size and sampling interval from each class. Balloting was used to determine the first out of the first ten students on the class list.

Eligibility for study was being a full time student. Pregnant students were excluded from the study. The questionnaire was pre-tested among thirty full time undergraduate students of Caleb University. Data was collected using semi-structured, self-administered questionnaire and pro-forma for recording anthropometry. The first section of the questionnaire on socio-demographic characteristics was adapted from past literature review [25,27]. The second section consists of the standard Figure Rating Scale (FRS), for measuring body dissatisfaction [28]. The scale consists of silhouette drawings ranging from extremely thin (1) to very obese (9) in appearance. From the 9 body figures, participants were asked to identify their perceived body image (*i.e.* how they think they look) and ideal body image

(*i.e.* what they want to look like). The third section consists of the Weight Control Strategy Scale (WCSS), a validated self-report instrument developed, used to assess weight control behaviors. The 30-item WCSS contains 4 subscales: dietary choices, self-monitoring Strategies, Physical activity and psychological Coping. Each item is rated on a likert scale from 0 (never) to 4 (always) [29].

The anthropometric measurements, *i.e.* height and weight of each student were taken according to the standard technique as described by the World Health Organization to assess the nutritional status of the students [30]. The questionnaire was pre-tested by the researcher among thirty full-time undergraduate students of Caleb University with a view to testing the reliability of the instrument and making appropriate corrections, where necessary. The participants were told to complete the paper questionnaire with biro and define weight management as activities or lifestyle changes that were done to control weight gain or loss or that were done to maintain a certain body weight. Statistical analysis was done using Statistical Package for Social Sciences (SPSS Version 23). Socio-demographic data was analyzed using descriptive statistics. Frequency distribution was generated for variables. Body image perception was analyzed using the scores on the Standard figure rating scale. The difference between perceived body image and desired body image was used to determine the level of dissatisfaction with current body image. Values other than zero represented body image dissatisfaction. A positive value is indicative of the participant's wish to be thinner than the perceived current size, while a negative value reflects the participant's wish to be heavier than the current perceived size [28]. Weight management strategies were analyzed using the scores on the weight control strategies scale. All item scores were added and divided by 30 to get the total score. To obtain the subscale scores, each subscale item scores was summed up and divided by the number of items in the subscale as follows: Dietary control (10 items): 19, 20, 21, 22, 23, 24, 25, 26, 27, 28; Self-monitoring strategies (7 items: 29, 30, 31, 32, 33, 34, 35; Physical activity (6 items: 36, 37, 38, 39, 40, 41; Psychological coping (7 items: 42, 43, 44, 45, 46, 47, 48; Higher scores indicated greater use of weight management strategies. The Body Mass Index (BMI of the respondents was calculated using the weight and height by dividing the weight in kilograms by the height in meters squared (weight/height^2. The BMI was analyzed according to WHO standards and categorized as follows: underweight (BMI<18.5, normal weight (BMI 18.5-24.9, overweight (BMI 25-29.9, and obese (BMI>30. Associations between variables were calculated using *Chi-square* (χ^2) test with level of significance set at $p \leq 0.05$. Ethics approval was obtained from the Human Research and Ethics Committee of the Lagos University Teaching Hospital and Lagos State University Teaching Hospital. The approval numbers are ADM/DCST/HREC/APP/3073 and LREC/06/10/1296 respectively. The research was conducted according to the principles expressed in the declaration of Helsinki. Permission was obtained from the dean of students' affairs of the two schools informed written consent was obtained from each respondent before participating in the research. Confidentiality was assured and maintained throughout the study.

Results

The mean age was 20.68 ± 2.96 years. Age ranged from 15 to 31 years with a higher proportion (59.9%) in the 15-20 years age group. There were 467 female students (54.0%) and 398 male students (46.0%) who participated in the study. Majority of the respondents were christians (71.1%) and 93.8% were single. The prevalence of body image dissatisfaction was 63.5% among the students. The prevalence of dissatisfaction was not associated with gender (P=0.445), however, the pattern of dissatisfaction showed that more males desired to be heavier while more female students desired to be thinner (Table 1).

Table 1: Prevalence of body image dissatisfaction and pattern of dissatisfaction according to gender.

	Body Image dissatisfaction (n=865)		Pattern of dissatisfaction (n=549)	Total	
	Satisfied (%)	Dissatisfied (%)	Desire to be thinner		Desire to be heavier
Female	176 (37.7)	291 (62.3)	134 (28.7)	157 (33.6)	467 (100.0)
Male	140 (35.2)	258 (64.8)	89 (22.4)	169 (42.5)	398 (100.0)
Total	316 (36.5)	549 (63.5)	223 (25.8)	326 (37.7)	865 (100.0)

The gender distribution of BMI among the students was found to be similar and the differences between the prevalence of overweight and obesity between females (10.1%,7.3%) and males (11.3%,7.0%) were not statistically significant P=0.936 (Table 2).

Table 2: Weight management strategies employed by the respondents.

Strategy	Freq (n=807)	Percentage (%)
Dietary control	318	39.4
Physical activity	158	19.6

Psychological coping	149	18.5
Self-monitoring strategy	81	10
Dietary control and Physical activity	20	2.5
dietary control and psychological coping	15	1.9
dietary control and self-monitoring strategy	7	0.9
physical activity and psychological coping	14	1.7
self-monitoring strategy and physical activity	8	1
self-monitoring strategy and psychological coping	11	1.4
self-monitoring strategy, physical activity and psychological coping	5	0.6
Dietary control, Self-monitoring strategy, Physical activity and Psychological coping	21	2.6
Others		
Use of diet pills (supplements, Appetite suppressants)	277	34.3
Use of herbal mixtures	303	37.5
Self-induced vomiting	178	22.1
Use of methamphetamine (tik)	138	17.1
Use of laxatives	159	19.7
Use of diuretics	148	18.3
Smoking more cigarettes	95	11.8
Strict dieting	304	37.7
Adequate water intake	240	29.4
Adequate duration of sleep	573	71

Majority of the respondents, 807 (93.3%) engaged in weight management practices. Healthy dietary control was the most frequent strategy employed (39.4%); only 19.6% of the respondents engaged in physical activity and 12.5% used combination of one or more of the methods. The most commonly employed unhealthy practices are strict dieting (37.7%) and use of herbal mixtures (37.5%) (Table 3).

Table 3: Association between body image dissatisfaction and body mass index as well as weight management strategies.

Body image Dissatisfaction	Body Mass Index					χ^2	P-Value
	Under weight	**Normal**	**Over weight**	**Obese**	**Total**		
Satisfied	44 (32.8)	205 (39.0)	31 (34.8)	6 (10.3)	286 (35.4)	19.246	0.001
Dissatisfied	90 (67.2)	321 (61.0)	58 (65.2)	52 (89.7)	521 (64.6)		
	Weight management strategies						
	Dietary Control	Physical activity	Psychological coping	Self-monitoring strategy	Total		
Satisfied	129 (51.0)	51 (20.2)	52 (20.6)	21 (8.3)	253 (100.0)	7.904	0.095
Dissatisfied	189 (41.7)	107 (23.6)	97 (21.4)	60 (13.2)	453 (100.0)		

The weight management strategy employed by the students was not significantly associated with the level of dissatisfaction with their body image (P=0.095) as many students used weight management strategies regardless of their body image dissatisfaction. The prevalence of body image dissatisfaction was found to be high across all BMI groups. The highest dissatisfaction (89.7%) was among the obese group (P=0.001). However, there was no statistically significant association between nutritional status and weight management strategies, P=0.087 (Figure 1).

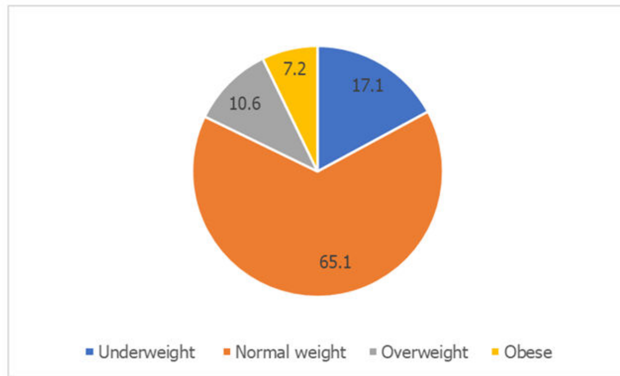

Figure 1: Nutritional status of university undergraduate students in Lagos, Nigeria.

Discussion

The prevalence of body image dissatisfaction in this study was 63.5%. This high prevalence is in keeping with other studies conducted around the world such as Europe (62.0%) Malaysia (77.8%), and Saudi Arabia (73.6%). The high prevalence of body image dissatisfaction in general could be attributed to a global social construction of standards of beauty wherein slimness is considered synonymous to beauty. This identical ideology across peoples and continents could be attributed to the inter-connectedness through social media where information is spread rapidly at the click of a button regardless of geographic and cultural boundaries. There was no statistically significant difference in the level of dissatisfaction with body image in the male and female genders. This finding requires further exploration as some studies in Iran and Brazil found the female students to be more dissatisfied with their body image than the males [31-33]. And other studies have shown that women are much more likely than men to categorize themselves as overweight and express dissatisfaction [34,35].

A Canadian study found a strong predictor of male body image dissatisfaction to be weight-height ratio [36]. The disparity seen in this study may be adduced to differences in societal expectations between developed and developing countries which may influence satisfaction levels. Most of the participants in this study employed weight management strategies irrespective of body image satisfaction or dissatisfaction. The pattern of dissatisfaction showed that more males desired to be heavier while more females desired to be thinner. A similar trend was reported in a study conducted in Malaysia. This could be in conformity to society's perception of female attractiveness as thinness [37], as well as males' need to appear muscular to be seen as more masculine [38]. Dietary control was the most frequent strategy used as a weight management strategy in this study while self-monitoring was the least used. Studies have shown that diet control is a critical component of weight management strategies [39].

More than half of the students were within the normal BMI range which correlates with previous studies conducted among undergraduate students in Nigeria [40,41]. Majority of the respondents, 807 (93.3%) engaged in weight management practices. In this study, females were more involved in weight management practices than the males. This trend was also reported in a study conducted in Malaysia 9 and another study in Mauritius, which found majority of the respondents involved in weight control practices to be females [42]. The weight management strategies identified among the students in this study were dietary control, physical activity, psychological coping and self-monitoring strategies. This finding was similar to a study in the United States where strategies included weighing self, increasing exercise intensity and increasing intake of fruits [43]. In Ghana, physical activities, lifestyle modification s and active dieting were the strategies employed while in UAE dietary control and physical activity were employed [25,44]. The students engaged in unhealthy management strategies such as strict dieting more than the healthy strategies. Unhealthy strategies included eating little food, skipping meals, fasting, smoking more cigarettes, self-induced vomiting, use of laxatives, diet pills and herbal mixtures were also identified among university undergraduate students in South Africa. The high prevalence of the use of weight control strategies especially unhealthy strategies shows that university undergraduates do not have robust knowledge of healthy weight management strategies and that there is a need to provide weight management education to them.

A high proportion of students who were obese were dissatisfied with their body image (89.7%) and our findings show a statistically significant relationship between body image perception and nutritional status (P=0.001) although there was no statistically significant association between nutritional status and weight management strategies. This agrees with previous research which found that study participants who expressed body image dissatisfaction were 70% less likely to have a healthy nutrition. Studies among Moroccan university undergraduate students showed that those who were underweight and overweight had significantly higher prevalence of dissatisfaction while those with body image satisfaction had healthy nutritional status [45]. Another study in Arabia revealed that BMI was a predictor for dissatisfaction [46]. Significant correlation has also been reported in previous studies [47,48]. There was no significant association between weight management practices and body image perception of the undergraduate students. This is similar to the findings in a Ghanaian study, 25 however; it is contrary to a study in Malaysia where it was shown that body image perception was significantly associated with dietary control. This study also did not demonstrate any association between nutritional status and weight management strategies.

Conclusion

Body image dissatisfaction was high and associated with obesity but did not influence weight management practices among university undergraduate students in Lagos. The findings from this study call attention to the need to provide

education to university undergraduate students on healthy weight management practices.

What is already known on this Topic

- • The prevalence of body image dissatisfaction is high among university undergraduates
- • Body image dissatisfaction is associated with nutritional status and weight management strategies.

What this Study Adds

- There is high uptake of weight management strategies among university undergraduates in Lagos
- Undergraduates students who were obese had higher prevalence of body image dissatisfaction in Lagos, Nigeria.
- Body image dissatisfaction is not associated with weight management strategies among university undergraduates in Lagos.

Competing Interests

The authors declare that we have no competing interest.

Authors' Contributions

Olatona F, Aladelokun B and Adisa O conceptualized and designed the study Aladelokun B, Adisa O and Olatona F acquired and interpreted the data. FO, BA, OA, Ogunyemi A and Goodman O drafted the manuscript and critically revised it for important intellectual content. All authors read and approved the final manuscript.

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