



Weight-Related Status and Associated Predictors with Psychological Well-being among First-Year University Students in Bangladesh: A Pilot Study

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Abstract

University students (especially first-years) not only have to cope with their academic curriculum but also issues such as being away from the home environment and living independently for the first time. Those who do not adapt quickly to these new conditions are likely to be susceptible to physical and psychological vulnerabilities. The present study surveyed first-year Bangladeshi undergraduate students to investigate their weight status (i.e., the prevalence of being normal weight, underweight, overweight, and obese) and the prevalence of depression and associated risk factors. A cross-sectional survey was conducted among 404 first-year university students (aged 18–23 years) residing at a Bangladeshi university. The participants completed a survey examining socio-demographic and behavioral variables, alongside the WHO-5 Well-Being Index. Binary logistic regression was performed to determine significant associations between the variables under examination. Prevalence rates of being normal weight, underweight, overweight, and obese were 66.8%, 20.3%, 9.7%, and 3.2% respectively. Associated predictors of weight-related problems were being female and lack of physical exercise. The prevalence rate of depression was 68.1%. There were no significant gender differences and associated predictors of depression were lack of physical exercise, unsatisfactory sleep quality, excessive internet use, and excessive reading hours. Being underweight, overweight, or being obese alongside the prevalence of depression among first-year university students were high. Findings indicate that first-year university students are a vulnerable group for some physical and psychological problems. Findings recommend the need for intervention programs, alongside adequate and appropriate supportive services for first-year Bangladeshi university students.

Keywords Weight status · First-year university students · Student well being · Psychological well being · Depression

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Going to study at university can be one of the most life-changing events in an individual's life. At university, students (especially those in their first year) need to adapt to new academic and social interests in their preparation for a future profession as well as adapting to physical and psychological changes that are associated with the development of a self-sufficient independent life (Alim et al. 2017). At the beginning of their university life, students can face many challenges including loneliness, personal autonomy, self-confidence, academic performance, studying in the English language, heavy lecture schedules, pressure to succeed, future planning, and peer pressure from both family and friends (Asghar et al. 2019; Al Bahhawi et al. 2018; Beiter et al. 2015; Subhaluksuksakorn et al. 2016). Moreover, first-year students need to cope with a new residence (living away from their family in halls, dormitories, etc.), a new daily food pattern (often having to cater for themselves), a new study curriculum (including class lectures, laboratory classes, presentations, fieldwork, etc.), new friends, new teachers, and a wide range of new physical environments. These new conditions can sometimes impact on their weight status and their psychological well being.

The prevalence of weight-related health conditions (malnutrition and being underweight, or being overweight and obese) appears to be increasing worldwide in both developing and developed countries (as well as in Bangladesh where the present study was carried out). For instance, the prevalence of obesity has increased threefold in developing countries due to urbanization with increased consumption of high-calorie foods and sedentary lifestyle in the past 20 years (Ahmed et al. 2019; Hu 2008). While there are many studies on nutrition, weight status, and psychological wellbeing (particularly concerning depression) among emerging adults, there is a knowledge gap relating to weight status and psychological wellbeing among first-year university students in Bangladesh. A previous study of all university students (not just first-year) in Bangladesh reported that the prevalence rates of being normal weight, underweight, overweight, and obese were 67.3%, 10.8%, 18.8%, and 3.1% respectively (Ahmed et al. 2019). According to the World Health Organization (WHO), more than 1.9 billion and 650 million adults (18 years and older) were overweight and obese, respectively, in 2016 (World Health Organization 2018). In relation to psychological wellbeing, a study of Bangladeshi medical students reported that the prevalence of depression was 54.3% (Alim et al., 2017). A more recent study of Bangladesh university students (not just first-year) reported that the prevalence of depression was 52.2% (Mamun et al. 2019). According to the WHO, more than 264 million people of all ages suffer from depression globally (World Health Organization 2019).

Previous studies have reported several contributing factors to weight-related problems including socio-demographics and lifestyle-related factors. These include being female, infrequent daily meals, sedentary lifestyles, poor eating habits, irregular breakfasts, lack of physical exercise, and increased consumption of fast food and beverages (Al Bahhawi et al. 2018; Iqbal et al. 2015; Radzi et al. 2019). In relation to depression, there can be many contributory factors and associated behaviors including loneliness, lack of self-confidence, marital breakdown, family history of depression, lack of taking physical exercise, poor sleep habits, poor diet, cigarette smoking, and alcohol consumption, (Arslane et al. 2009; Beiter et al. 2015; Lun et al. 2018).

At present, there is a knowledge gap among first-year university students in Bangladesh because there has been no previous study investing the prevalence of weight-related problems (being underweight, overweight, or obese) and psychological wellbeing (and more specifically depression). Consequently, the present study investigated weight-related status (i.e., the prevalence of being normal weight, underweight, overweight, and obese) and prevalence of

depression alongside associated predictors among first-year university students who lived in university accommodation at a Bangladeshi university.

Methods

Participants and Procedure

A cross-sectional survey was conducted among first-year students of a university in Bangladesh (all of who were Bangladeshi). Data were collected from August to November 2019. Convenience sampling was used to collect the data. Initially, 450 first-year university students were approached to complete a self-report questionnaire at their respective departments or dormitories. After eliminating incomplete surveys, 404 remained for analysis. The participants comprised 51.1% males and 48.3% females, and their mean age was 19.65 years ($SD = 0.89$) ranging from 18 to 23 years. The inclusion criterion to participate in the study was being a first-year student.

Measures

Socio-Demographic Measures

A self-administered survey contained questions concerning socio-demographics and personal lifestyle-related information, as well as a psychometric scale to assess depression. Socio-demographic data collected included gender, age, religion, number of siblings, father's occupation, monthly family income, permanent residence (whether it was a rural or urban area), height, and weight. Social class was categorized into three groups based on monthly family income: low-class (less than 10,000 Bangladeshi taka [BDT]), middle-class (10,000–20,000 BDT), and upper-class (more than 20,000 BDT).

Personal Lifestyle-Related Data

Personal lifestyle-related data were collected by asking questions concerning whether the individual engaged in daily physical exercise (yes/no), amount of daily internet use, use of social media (yes/no), gaming use (yes/no), number of hours sleep per night, sleeping satisfaction (yes/no), and number of daily reading hours. Sleeping hours were categorized into three classes on the basis of average daily sleeping hours and classed as normal (7–8 h), less than average (<6 h), or more than average (>9 h) (based on Hirshkowitz et al. 2015).

Body Mass Index

Body mass index (BMI) is a good indicator of weight-related status in a population (Hossain et al. 2012). The WHO Expert Committee has recommended that routine measures of height and weight provide a useful assessment of this variable (World Health Organization 1995). In the present study, the body's weight and height were assessed by using self-reports of the individual's weight (in kilograms [kg]) and height (in inches). Inches were converted into meters (m). Finally, BMI was calculated as the ratio of weight in kilograms (kg) divided by the square of height in meters (m^2), i.e., $BMI = \text{weight (kg)}/\text{height}^2(m^2)$. In the present study, BMI

cutoff points were $< 18.5 \text{ kg/m}^2$ (underweight), $18.5\text{--}24.9 \text{ kg/m}^2$ (normal weight), $25\text{--}29.9 \text{ kg/m}^2$ (overweight), and $\geq 30 \text{ kg/m}^2$ (obese) (Hossain et al. 2012; Subramanian et al. 2009). Finally, participants who were underweight, overweight, or obese were considered as having weight-related problems, whereas participants of normal weight were considered as having no weight-related problems.

WHO-5 Well-Being Index

The WHO-5 Well-Being Index (World Health Organization 1998) is among the most widely used scales assessing subjective psychological wellbeing (in this case, depression) (Topp et al., 2015). The WHO-5 Well-Being Index is a five-item scale and was used to screen for depression in the present study. Items are rated a six-point Likert scale ranging from 0 (“At no time”) to 5 (“At all of the time”) for the past 2 weeks. Scores were summed with raw scores ranging from 0 to 25. For interpretation, the raw scores are altered to 0–100 by multiplying by four, with higher scores indicating better psychological wellbeing. In the present study, the cutoff score was ≤ 50 for the depression. The sensitivity and specificity of WHO-5 Well-Being Index to screen depression using a cutoff score of ≤ 50 in previous studies were 0.92 and 0.79 (Allgaier et al. 2013), 0.96 and 0.76 (Liwowsky et al. 2009), and 0.89 and 0.65 (Saipanish et al. 2009). In the present study, the Cronbach’s alpha was 0.79.

Statistical Analysis

The data were analyzed using Microsoft Excel 2019 and IBM SPSS Statistics version 25. Microsoft Excel was used for data entry, editing, and sorting. Descriptive statistics (frequencies, percentages, means) and some first-order analysis (chi-square tests, etc.) were executed using SPSS software. Binary logistic regression was performed with a 95% confidence interval to determine the significant associations between categorical dependent and independent variables.

Ethics

The study was carried out in accordance with the Institutional Research Ethics and The Code of Ethics of the World Medical Association (Declaration of Helsinki). Formal ethics approval was granted by the research team’s university ethics committee. The survey data were collected anonymously and all participants gave their written informed consent to participate. All the participants were provided with information concerning the purpose of the study prior to data collection. The consent form outlined the (i) confidentiality and anonymity of their data, (ii) nature and procedure of the study, (iii) option to take part in the study, and (iv) right to withdraw their data at any time from the study.

Results

The descriptive statistics for all variables are presented in Table 1. The majority of respondents came from a rural area (59.4%), did not take regular daily physical exercise (54.7%), used the internet from 2 to 4 h daily (38.6%), were less than normal sleepers (71%), were satisfied with their sleep (56.4%), and read for less than 2 h daily (61.9%). The prevalence rates of being

normal weight, underweight, overweight, and obese were 66.8%, 20.3%, 9.7%, and 3.2% respectively. Based on the WHO-5 Well-Being Index, the prevalence rate of depression was 68.1%. Those with weight-related problems were significantly more likely than those of normal weight (i) to be female ($\chi^2=4.76$, $df=1$, $p<0.029$), and (ii) not engage in daily physical exercise ($\chi^2=4.24$, $df=1$, $p<0.04$). Those who were depressed were significantly more likely than those not depressed to (i) not engage in daily physical exercise ($\chi^2=7.26$, $df=1$, $p<0.007$), (ii) use internet ranging from two to 4 h daily ($\chi^2=6.21$, $df=2$, $p<0.045$), (iii) have unsatisfactory sleep quality ($\chi^2=34.27$, $df=1$, $p<0.001$), and (iv) to be engaged in reading less than 2 h daily ($\chi^2=20.38$, $df=2$, $p<0.001$).

A binary regression analysis was performed to assess the significant associations between dependent and independent variables displayed in Table 2. Males were 0.63 times less likely than females to have weight-related problems (OR = 0.63; 95% CI = 0.42–0.96, $p=0.03$). Those engaged in daily physical exercise were 0.64 times less likely than those not engaging in daily physical exercise to have weight-related problems (OR = 0.64; 95% CI = 0.42–0.98, $p=0.04$). Those engaged in daily physical exercise were 0.56 times less likely than those not engaged in daily physical exercise to be depressed (OR = 0.56; 95% CI = 0.368–0.856, $p=0.007$). Those using the internet less than 2 h daily were 0.5 times less likely than those using the internet more than 4 h daily to be depressed (OR = 0.5; 95% CI = 0.29–0.88, $p=0.015$). Those having satisfactory sleep quality were 0.25 times less likely than those having unsatisfactory sleep quality to be depressed (OR = 0.25; 95% CI = 0.157–0.407, $p<0.001$). Those engaging in reading two to 4 h daily were 0.43 times less likely than those engaging in reading more than 4 h daily to be depressed (OR = 0.43; 95% CI = 0.22–0.85, $p=0.016$).

Discussion

First-year university students are potentially vulnerable individuals and, as a consequence, they may engage in unhealthy dietary habits and have sedentary lifestyles that affect their physical and psychological wellbeing (Ahmed et al. 2019). Although weight-related status and the psychological wellbeing of university students have been much studied by researchers globally, there are very few data about these issues in Bangladesh. Only a few studies have been conducted in Bangladesh with regard to weight-related status and psychological wellbeing. Consequently, there is a knowledge gap in Bangladesh which is why the present study addressed these issues among first-year university students in Bangladesh.

The present study found that the prevalence of being normal weight, underweight, overweight, and obese were 66.8%, 20.3%, 9.7%, and 3.2%, respectively. These findings indicated that one-third of the first-year university students (33.2%) had weight-related problems (at least to some extent) in the present sample (i.e., being underweight, overweight, or obese). Compared with a previous study in Bangladesh among all university students (not just first-years) (Ahmed et al. 2019), the prevalence of being normal weight (66.8% vs. 67.3%), underweight (20.3% vs. 10.8%), overweight (9.7% vs. 18.8%), or obese (3.2% vs. 3.1%) were different in the present sample because participants here were much more underweight and much less overweight. The present study also reported that a prevalence rate for depression as 68.1% which is higher than the previous studies of first-year medical college students (54.3%; Alim et al. 2017) and a recent study of all university students (not just first-years) in

Table 1 Distribution of variables and association with weight-related status and depression among first-year university students

Variables	Categories	Total = 404		Male				Female			
		Weight-related status		Depression		Weight-related status		Depression			
		Normal	Non-normal	Yes	No	Normal	Non-normal	Yes	No		
		N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Gender	Male	209 (51.7)	150 (71.8)	59 (28.2)	146 (69.9)	63 (30.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
	Female	195 (48.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	120 (61.5)	75 (38.5)	129 (66.2)	129 (66.2)	129 (66.2)
Age	17–20	343 (84.9)	119 (72.1)	46 (27.9)	122 (73.9)	43 (26.1)	107 (60.1)	71 (39.9)	116 (65.2)	116 (65.2)	116 (65.2)
	21–23	61 (15.1)	31 (70.5)	13 (29.5)	24 (54.5)	20 (45.5)	13 (76.5)	4 (23.5)	13 (76.5)	13 (76.5)	13 (76.5)
	Islam	361 (89.4)	131 (72.4)	50 (27.6)	126 (69.6)	55 (30.4)	110 (61.1)	70 (38.9)	120 (66.7)	120 (66.7)	120 (66.7)
Religion	Hindu	40 (9.9)	18 (69.2)	8 (30.8)	19 (73.1)	7 (26.9)	9 (64.3)	5 (35.7)	8 (57.1)	8 (57.1)	8 (57.1)
	Buddha	3 (0.7)	1 (50.0)	1 (50.0)	1 (50.0)	1 (50.0)	1 (100.0)	0 (0.0)	1 (100.0)	1 (100.0)	1 (100.0)
Number of siblings	1–2	166 (41.1)	58 (76.3)	18 (23.7)	50 (65.8)	26 (34.2)	59 (65.6)	31 (34.4)	62 (68.9)	62 (68.9)	62 (68.9)
	3–4	184 (45.5)	69 (68.3)	32 (31.7)	74 (73.3)	27 (26.7)	45 (54.2)	38 (45.8)	53 (63.9)	53 (63.9)	53 (63.9)
	>4	54 (13.4)	23 (71.9)	9 (28.1)	22 (68.8)	10 (31.3)	16 (72.7)	6 (27.3)	14 (63.6)	14 (63.6)	14 (63.6)
Monthly family income	Lower class	115 (28.5)	62 (75.6)	20 (24.4)	52 (63.4)	30 (36.6)	19 (57.6)	14 (42.4)	23 (69.7)	23 (69.7)	23 (69.7)
	Middle class	95 (23.5)	36 (75.0)	12 (25.0)	36 (75.0)	12 (25.0)	23 (48.9)	24 (51.1)	27 (57.4)	27 (57.4)	27 (57.4)
	Upper class	194 (48.0)	52 (65.8)	27 (34.2)	58 (73.4)	21 (26.6)	78 (67.8)	37 (32.2)	79 (68.7)	79 (68.7)	79 (68.7)
Permanent residence	Rural	240 (59.4)	101 (73.7)	36 (26.3)	94 (68.6)	43 (31.4)	64 (62.1)	39 (37.9)	68 (66.0)	68 (66.0)	68 (66.0)
	Urban	164 (40.6)	49 (68.1)	23 (31.9)	52 (72.2)	20 (27.8)	56 (60.9)	36 (39.1)	61 (66.3)	61 (66.3)	61 (66.3)
Daily physical exercise	Yes	183 (45.3)	87 (78.4)	24 (21.6)	65 (58.6)	46 (41.4)	45 (62.5)	27 (37.5)	47 (65.3)	47 (65.3)	47 (65.3)
	No	221 (54.7)	63 (64.3)	35 (35.7)	81 (82.7)	17 (17.3)	75 (61.0)	48 (39.0)	82 (66.7)	82 (66.7)	82 (66.7)
Daily internet use (hours)	<2 h	141 (34.9)	67 (76.1)	21 (23.9)	57 (64.8)	31 (35.2)	27 (50.9)	26 (49.1)	29 (54.7)	29 (54.7)	29 (54.7)
	2–4 h	156 (38.6)	57 (71.3)	23 (28.7)	55 (68.8)	25 (31.3)	46 (60.5)	30 (39.5)	53 (69.7)	53 (69.7)	53 (69.7)
	>4 h	107 (26.5)	26 (63.4)	15 (36.6)	34 (82.9)	7 (17.1)	47 (71.2)	19 (28.8)	47 (71.2)	47 (71.2)	47 (71.2)
Using social media	Yes	400 (99.0)	147 (71.4)	59 (28.6)	145 (70.4)	61 (29.6)	119 (61.3)	75 (38.7)	128 (66.0)	128 (66.0)	128 (66.0)
	No	4 (1.0)	3 (100.0)	0 (0.0)	1 (33.3)	2 (66.7)	1 (100.0)	0 (0.0)	1 (100.0)	1 (100.0)	1 (100.0)
Playing video games	Yes	112 (27.7)	64 (77.1)	19 (22.9)	62 (74.7)	21 (25.3)	15 (51.7)	14 (48.3)	22 (75.9)	22 (75.9)	22 (75.9)
	No	292 (72.3)	86 (68.3)	40 (31.7)	84 (66.7)	42 (33.3)	105 (63.3)	61 (36.7)	107 (64.5)	107 (64.5)	107 (64.5)
Sleeping status	Less than normal	287 (71.0)	127 (73.8)	45 (26.2)	119 (69.2)	53 (30.8)	65 (56.5)	50 (43.5)	73 (63.5)	73 (63.5)	73 (63.5)
	Normal (7–8 h)	86 (21.3)	15 (53.6)	13 (46.4)	21 (75.0)	7 (25.0)	40 (69.0)	18 (31.0)	36 (62.1)	36 (62.1)	36 (62.1)
	More than normal	31 (7.7)	8 (88.9)	1 (11.1)	6 (66.7)	3 (33.3)	15 (68.2)	7 (31.8)	20 (90.9)	20 (90.9)	20 (90.9)

Table 1 (continued)

Variables	Categories	Total = 404		Male		Female					
		Weight-related status		Depression		Weight-related status		Depression			
		Normal	Non-normal	Yes	No	Normal	Non-normal	Yes	No		
		N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)		
Sleeping satisfaction	Yes	228 (56.4)	72 (70.6)	30 (29.4)	56 (54.9)	46 (45.1)	80 (63.5)	46 (36.5)	72 (57.1)		
	No	176 (43.6)	78 (72.9)	29 (27.1)	90 (84.1)	17 (15.9)	40 (58.0)	29 (42.0)	57 (82.6)		
	< 2 h	250 (61.9)	111 (72.1)	43 (27.9)	115 (74.7)	39 (25.3)	55 (57.3)	41 (42.7)	72 (75.0)		
Reading hours	2-4 h	95 (23.5)	26 (72.2)	10 (27.8)	18 (50.0)	18 (50.0)	45 (76.3)	14 (23.7)	29 (49.2)		
	> 4 h	59 (14.6)	13 (68.4)	6 (31.6)	13 (68.4)	6 (31.6)	20 (50.0)	20 (50.0)	28 (70.0)		
Weight-related status	Normal	270 (66.8)	150 (100.0)	0 (0.0)	105 (70.0)	45 (30.0)	120 (100.0)	0 (0.0)	78 (65.0)		
	Non-normal	134 (33.2)	0 (0.0)	59 (100.0)	41 (69.5)	18 (30.5)	0 (0.0)	75 (100.0)	51 (68.0)		
Depression	Yes	275 (68.1)	105 (71.9)	41 (28.1)	146 (100.0)	0 (0.0)	78 (60.5)	51 (39.5)	129 (100.0)		
	No	129 (31.9)	45 (71.4)	18 (28.6)	0 (0.0)	63 (100.0)	42 (63.6)	24 (36.4)	0 (0.0)		
Variables	Female	Both		Weight-related status		Depression		Weight-related status		Depression	
		Normal		Non-normal		Yes		No		Yes	
		N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Gender	Depression	Normal		Non-normal		Yes		No		Yes	
		N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
		0 (0.0)	150 (55.6)	59 (44.0)	4.764	1	0.029	146 (53.1)	63 (48.8)	0.636	1
66 (33.8)	120 (44.4)	75 (56.0)	0.910	1	0.340	129 (46.9)	66 (51.2)	1.817	1	0.178	
62 (34.8)	226 (83.7)	117 (87.3)	0.009	2	0.996	238 (86.5)	105 (81.4)	0.010	2	0.995	
4 (23.5)	44 (16.3)	17 (12.7)	3.679	2	0.159	37 (13.5)	24 (18.6)	0.153	2	0.926	
60 (33.3)	241 (89.3)	120 (89.6)				27 (9.8)	13 (10.1)				
6 (42.9)	27 (10.0)	13 (9.7)				2 (0.7)	1 (0.8)				
0 (0.0)	2 (0.7)	1 (0.7)				112 (40.7)	54 (41.9)				
28 (31.1)	117 (43.3)	49 (36.6)									

Table 1 (continued)

Variables	Female		Both		Depression										
	Depression		Weight-related status		Weight-related status		Depression		Depression						
	No	N (%)	Normal	Non-normal	Yes	No	Yes	No	Yes	No	Yes	df	p value		
	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)			
Monthly family income	30	(36.1)	114	(42.2)	70	(52.2)	127	(46.2)	57	(44.2)	18	(14.0)	1.145	2	0.564
	8	(30.4)	39	(14.4)	15	(11.2)	36	(13.1)	40	(27.3)	32	(24.8)			
	10	(30.3)	81	(30.0)	34	(25.4)	65	(23.3)	40	(27.3)	32	(24.8)			
	20	(42.6)	59	(21.9)	36	(26.9)	73	(26.9)	57	(49.8)	78	(60.5)			
Permanent residence	36	(31.3)	130	(48.1)	64	(47.8)	137	(49.8)	57	(44.2)	78	(60.5)	1.145	2	0.564
	35	(34.0)	165	(61.1)	75	(56.0)	162	(58.9)	51	(39.5)	71	(55.0)			
	31	(33.7)	105	(38.9)	59	(44.0)	113	(41.1)	51	(39.5)	71	(55.0)	7.258	1	0.007
Daily physical exercise	25	(34.7)	132	(48.9)	51	(38.1)	112	(40.7)	71	(55.0)	58	(45.0)			
	41	(33.3)	138	(51.1)	83	(61.9)	163	(59.3)	58	(45.0)	55	(42.6)	6.213	2	0.045
Daily internet use (hours)	24	(45.3)	94	(34.8)	47	(35.1)	86	(31.3)	55	(42.6)	48	(37.2)			
	23	(30.3)	103	(38.1)	53	(39.6)	108	(39.3)	48	(37.2)	26	(20.2)			
Using social media	19	(28.8)	73	(27.0)	34	(25.4)	81	(29.5)	26	(20.2)	127	(98.4)	0.607	1	0.436
	66	(34.0)	266	(98.5)	134	(100.0)	273	(99.3)	2	(0.7)	2	(1.6)			
	0	(0.0)	4	(1.5)	0	(0.0)	2	(0.7)	2	(0.7)	2	(1.6)			
Playing video games	7	(24.1)	79	(29.3)	33	(24.6)	84	(30.5)	28	(21.7)	28	(21.7)	3.425	1	0.064
	59	(35.5)	191	(70.7)	101	(75.4)	191	(69.5)	101	(78.3)	95	(73.6)			
Sleeping status	42	(36.5)	192	(71.1)	95	(70.9)	192	(69.8)	95	(73.6)	29	(22.5)	3.869	2	0.144
	22	(37.9)	55	(20.4)	31	(23.1)	57	(20.7)	29	(22.5)	5	(3.9)			
	2	(9.1)	23	(8.5)	8	(6.0)	26	(9.5)	5	(3.9)	100	(77.5)	34.265	1	<0.001
Sleeping satisfaction	54	(42.9)	152	(56.3)	76	(56.7)	128	(46.5)	100	(77.5)	29	(22.5)			
	12	(17.4)	118	(43.7)	58	(43.3)	147	(53.5)	29	(22.5)	63	(48.8)	20.38	2	<0.001
Reading hours	24	(25.0)	166	(61.5)	84	(62.7)	187	(68.0)	63	(48.8)	48	(37.2)			
	30	(50.8)	71	(26.3)	24	(17.9)	47	(17.1)	48	(37.2)	18	(14.9)			
	12	(30.0)	33	(12.2)	26	(19.4)	41	(14.9)	18	(14.9)	87	(67.4)	0.032	1	0.858
Weight-related status	42	(35.0)	270	(100)	0	(0.0)	183	(66.5)	42	(32.6)	42	(32.6)			
	24	(32.0)	0	(0.0)	134	(100)	92	(33.5)	42	(32.6)	0	(0.0)			
Depression	0	(0.0)	183	(67.8)	92	(68.7)	275	(100)	0	(0.0)	0	(0.0)			

Table 1 (continued)

Variables	Female		Both		Depression						
	Depression		Weight-related status		Non-normal			Depression			
	No	Normal	Non-normal	χ ²	df	p value	Yes	No	χ ²	df	p value
	N (%)	N (%)	N (%)	N (%)			N (%)	N (%)	N (%)		
	66 (100.0)	87 (32.2)	42 (31.3)				0 (0.0)	129 (100)			

Table 2 Regression analysis of variables by weight-related status and depression among first-year university students

Variables	Categories	Non-normal weight			Depression		
		Odds ratio (OR)	95% confidence interval (CI)	<i>p</i> value	Odds ratio (OR)	95% confidence interval (CI)	<i>p</i> value
Gender	Male	0.629	(0.415–0.955)	0.03	1.186	(0.780–1.802)	0.425
	Female	Reference			Reference		
Age	17–20	1.340	(0.733–2.448)	0.341	1.470	(0.838–2.581)	0.179
	21–23	Reference			Reference		
Religion	Islam	0.996	(0.089–11.092)	0.997	1.070	(0.096–11.916)	0.956
	Hinduism	0.963	(0.080–11.614)	0.976	1.038	(0.086–12.525)	0.976
Number of siblings	Buddhism	Reference			Reference		
	1–2	1.089	(0.550–2.155)	0.807	1.037	(0.540–1.991)	0.913
	3–4	1.596	(0.820–3.107)	0.168	1.114	(0.584–2.126)	0.743
	> 4	Reference			Reference		
Monthly family income	Lower class	0.853	(0.517–1.406)	0.532	0.780	(0.477–1.277)	0.323
	Middle class	1.239	(0.743–2.067)	0.411	0.819	(0.484–1.386)	0.457
Permanent residence	Upper class	Reference			Reference		
	Rural	0.809	(0.532–1.231)	0.322	0.937	(0.612–1.437)	0.767
Daily physical exercise	Urban	Reference			Reference		
	Yes	0.642	(0.421–0.980)	0.04	0.561	(0.368–0.856)	0.007
Daily internet use (hours)	No	Reference			Reference		
	< 2 h	1.074	(0.628–1.836)	0.796	0.502	(0.288–0.876)	0.015
	2–4 h	1.105	(0.654–1.867)	0.710	0.722	(0.414–1.261)	0.253
	> 4 h	Reference			Reference		
Using social media	No	0.000	(0.000–0.000)	0.999	0.465	(0.065–3.340)	0.447
	Yes	Reference			Reference		
Playing video games	Yes	0.790	(0.493–1.267)	0.328	1.586	(0.971–2.592)	0.065
	No	Reference			Reference		
Sleeping status	Less than normal	1.423	(0.613–3.299)	0.412	0.389	(0.145–1.044)	0.061
	Normal (7–8 h)	1.620	(0.648–4.054)	0.302	0.378	(0.131–1.087)	0.071
	More than normal	Reference			Reference		
Sleeping satisfaction	Yes	1.017	(0.670–1.545)	0.936	0.253	(0.157–0.407)	< 0.001
	No	Reference			Reference		
Reading hours	< 2 h	0.642	(0.361–1.144)	0.133	1.303	(0.699–2.431)	0.405
	2–4 h	0.429	(0.215–0.857)	0.16	0.430	(0.217–0.853)	0.016

Table 2 (continued)

Variables	Categories	Non-normal weight			Depression		
		Odds ratio (OR)	95% confidence interval (CI)	<i>p</i> value	Odds ratio (OR)	95% confidence interval (CI)	<i>p</i> value
BMI	> 4 h	Reference			Reference		
	Normal	–	–	–	1.041	(0.667–1.626)	0.858
Depression	Non-normal	1.041	(0.667–1.626)	0.858	Reference	–	–
	Yes	Reference			–		

Italicized values indicate significant variables at $p < 0.05$ significance level

Bangladesh (52.2%; Mamun, et al. 2019). However, such differences may have been due to the different screening instruments used to assess depression.

In an Asian context, compared with previous studies, the prevalence of being underweight, overweight or obese in the present study was generally higher than in studies among students in India (13.7%, 11.7%, and 2.01%; Chhabra, et al. 2006), Saudi Arabia (18.7%, 11.6%, and 6%; Majeed 2015), and Turkey (9.6%, 15.1%, and 3%; Uluöz 2016), but less than in Pakistan (26.5%, 14.8%, and 11.9%; Asghar et al. 2019), Malaysia (7.1%, 21.7%, and 16.8%; Radzi et al. 2019), and China (20.68%, 11.07%, and 17.6%; Subhaluksuksakorn et al. 2016). In the global context, compared with the previous studies, the prevalence of depression in the present study was higher than in studies among students in India (43.7%; Kumari et al. 2019), Pakistan (51.3%; Iqbal et al. 2015), China (11.7%; Chen et al. 2013), the Maldives (28.9%; Shanoora & Nawaza 2018), Malaysia (37.2%; Shamsuddin et al. 2013), Saudi Arabia (53.6%; Al Bahhawi et al. 2018), Jordan (24.6%; Hamaideh 2018), Turkey (21.8%; Arslan et al. 2009), Egypt (65%; Fawzy & Hamed 2017), and the USA (23%; Beiter et al. 2015) but less than in Hong Kong (68.5%; Lun et al. 2018).

The present study's findings indicated that (i) being female and (ii) lack of physical exercise were significant predictors of weight-related problems (see Table 2). Compared with previous studies, there were also significant associations between gender (females being more likely to have weight-related problems than male) in Bangladesh (Ahmed et al. 2019), Pakistan (Asghar et al. 2019), and China (Subhaluksuksakorn et al. 2016). However, a previous study in Turkey reported that males were more likely to have weight-related problems than females (Uluöz 2016). A previous study in Saudi Arabia also reported that those engaging in less physical exercise were more likely to have weight-related problems than those engaging in regular physical exercise (Majeed 2015), as found in the present study.

In the present study, no statistically significant association was found between any of the socio-demographic variables (including gender, age, religion, number of siblings, monthly family income, and residence area) and depression (see Table 1). Compared with previous studies among university students, there was also no significant association between socio-demographic variables (including gender, age, religion, number of siblings, monthly family income, and residence area) and depression in Bangladesh (Alim et al. 2017), Hong Kong (Lun et al. 2018), and Turkey (Arslan et al. 2009). A previous study among Indian university students also reported that there was no significant relationship between depression and socio-demographic variables (i.e., gender, age, monthly family income, and residence area) except for relationship with parents (i.e., those not having a good relationship with their parents were more likely to be depressed than those having a good relationship with their parent) and course (i.e., those on a medical course more likely to be depressed than those on an engineering course) (Kumari et al. 2019).

A previous study in Pakistan among medical students reported a significant relationship between socio-demographic variables including gender (i.e., females were more likely to be depressed than males) and age (i.e., younger individuals were more likely to be depressed than older individuals) (Iqbal et al. 2015). A previous study among Malaysian university students reported no significant relationship between some socio-demographic variables (i.e., gender, ethnicity, study major, monthly family income) and depression (Shamsuddin et al. 2013). However, the same study reported significant differences with regard to age (i.e., students older than 20 years were more likely to be depressed than those aged 19 years or younger) and permanent residence (i.e., those coming from rural areas were more likely to be depressed than those coming from urban areas).

The present study indicated that the significant predictors of depression were (i) less engagement in regular exercise, (ii) using the internet more than 4 h daily, (iii) having unsatisfactory sleep quality, and (iv) engaging in studies more than 4 h daily (see Table 2). This compares with a recent Bangladeshi study (i.e., Mamun et al. 2019) which reported significant associations concerning socio-economic status (i.e., those coming from a lower-class family more likely to be depressed than those coming from middle- and higher-class families), physical exercise (i.e., those engaging in less physical exercise more likely to be depressed than those engaging regular physical exercise), and smoking (i.e., cigarette smokers more likely to be depressed than those being non-smokers) and depression. A previous study in Hong Kong reported physical exercise was a significant predictor of depression (i.e., those engaging in less physical exercise more likely to be depressed than those engaging regular physical exercise) (Lun et al. 2018). Previous studies have also reported that depression was associated with taking less physical exercise, poor sleep habits, poor diet, cigarette smoking, and alcohol consumption (Arslan et al. 2009; Beiter et al. 2015; Lun et al. 2018).

Finally, it should be reiterated that the prevalence rates of being normal weight (66.8%), underweight (20.3%), overweight (9.7%), and obese (3.2%) among first-year university students in Bangladesh were relatively higher (33.2% weight-related problems) compared with the aforementioned studies carried out in other countries. The present study found that the most significant predictors associated with the high prevalence of weight-related problems were being female and a lack of physical exercise. Other factors that were not investigated in the present study but which may have contributed to the high prevalence rates include infrequent daily meals, sedentary lifestyle, eating habits, irregular breakfast, and increased consumption of fast food and beverages (Al Bahhawi et al. 2018; Iqbal et al. 2015; Radzi et al. 2019).

The prevalence rate of depression (68.1%) among first-year university students in Bangladesh was relatively high compared with the aforementioned studies carried out in other countries. The present study found that the most significant predictors associated with depression were lack of physical exercise, unsatisfactory sleep quality, excessive use of the internet, and reading for more than 4 h daily. Other factors that were not investigated in the present study but which may have contributed to the high prevalence of depression include relationship problems, loneliness, personal autonomy, self-confidence, any chronic disease, family history of depression, family and peer pressure, academic performance, studying in English language, heavy lecture schedule, pressure to succeed, and future career planning (Asghar et al. 2019; Al Bahhawi et al. 2018; Beiter et al. 2015; Subhaluksuksakorn et al. 2016).

Implications

Based on the relatively high prevalence rates of weight-related problems and depression found among first-year Bangladeshi university students, it appears specific measures are needed to help protect this vulnerable population. University authorities and healthcare professionals need their attention drawn to this vulnerable population so that such physical and psychological problems can be prevented from occurring in the first place. University authorities need to make students aware of engaging in regular exercise, moderating their use of the internet, improving sleep quality, and moderating daily reading hours. Intervention programs should be organized on campus to raise awareness of physical and psychological health among university students. University students should be provided with the information and skills to deal with factors reported in other studies such as the need for proper daily meals, an active

lifestyle, eating regular breakfasts, and decreased consumption of fast food and beverages to be well-nourished and to reduce weight-related problems (Al Bahhawi et al. 2018; Iqbal et al. 2015; Radzi et al. 2019). However, based on the findings of the present study, intervention and awareness programs need to emphasize the importance of regular exercise, sleep hygiene, moderate use of internet, and moderated reading hours in improving weight-related problems and psychological wellbeing among first-year university students.

Limitations

There were several limitations to this study. Firstly, the modestly sized sample is only representative in one university in Bangladesh and might not be representative of other Bangladeshi universities or universities in other countries. Therefore, studies utilizing bigger samples from more representative university populations are needed. Secondly, the study was cross-sectional in nature and is therefore unable to give any indication of causality. Therefore, carrying out a longitudinal study would overcome this limitation in understanding potential causal relationships. Thirdly, the study used a self-report methodology that might have prejudiced the outcomes through well-known biases such as social desirability and memory recall. This is of particular note in relation to the calculation of BMI which relied totally on self-report rather than using objective measurement of actual height and weight.

Conclusion

The present study gathers novel information that addresses a confirmed knowledge gap regarding weight-related status and psychological wellbeing among first-year university students in Bangladesh. This study found a high prevalence of weight-related problems (being underweight, overweight, or obese) and depression compared with the existing global studies and highlighted a number of risk factors that are significantly associated with weight-related problems (i.e., being female and lack of physical exercise) and depression (i.e., lack of physical exercise, unsatisfactory sleep quality, excessive daily use of the internet, and excessive reading hours). These risk factors should be addressed by the respective Bangladeshi authorities (e.g., university counselors and practitioners, public health policymakers) in trying to facilitate a student-friendly environment that helps improve weight-related status and psychological wellbeing among first-year university students.

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Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval The study was approved by Biosafety, Biosecurity and Ethical Clearance Committee, Jahangirnagar University, Savar, Dhaka-1342. The study was carried out in accordance with the Institutional Research Ethics and the Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving human participants. Informed written consent was obtained prior to the selection of the students and before data was gathered.

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