



Trends in Weight among Undergraduate Students in a Northeast Public University

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Abstract

Objective: Increasing BMI, overweight, and obesity are urgent and grave problems in the US. The goal of this study is to begin to understand trends in overweight and obesity among undergraduate students in the U.S. to assist in informing public health education and health promotion practices.

Methods: Data on self-reported weight and height were collected in 2012, 2014, and 2016 from randomly selected college students who were enrolled in a public university in Northeast US. Spearman's Rank Order Test was used to evaluate trends within specific demographic categories.

Results: BMI increased for almost all students from 2012-2016. Groups with significant increases in BMI included: males, females, sophomores, and seniors.

Conclusions: Results suggest the need for interventions to reduce increases in overweight and obesity that are experienced during college years. College is a critical transitional time when students adopt health behaviors that they continue into adulthood. Increasing BMI in college students indicates a need for additional research to understand the factors that contribute to the increasing trend of overweight and obesity in this population. College is an optimal setting for implementation of effective interventions that can help prevent BMI increases in this population and establish healthy behaviors for the future.

Keywords: Overweight, Obesity, College Students, BMI, Spearman's Rank, Interventions

Introduction

Overweight and obesity are global problems. The World Obesity Federation (WOF) defines obesity as "a chronic, relapsing disease..... that fits an epidemiological model of a disease process except that the toxic or pathological agent is food rather than a microbe" [1]. In fact, 30% of the global population is characterized as obese worldwide. The United States is at the top of the list when it comes to nations that continue to see the rise of overweight and obesity in persons of all ages and across all socioeconomic statuses, as measured by Body Mass Index (BMI) [1-4]. In fact, the Center for Disease Control and Prevention (CDC) revealed in 2016 that more than 79 million adults and 12 million youth are obese [5]. The American College Health Association reports that 34% of college students are classified as overweight or obese [6, 7], a statistic that is particularly troubling given the large number of chronic diseases

that are associated with obesity.

The CDC estimates that people who suffer from overweight and obesity have higher average individual medical cost by approximately \$1,429 annually. On a national level, the annual cost of obesity to the U.S. economy is well over \$150 billion, when loss of time from work and productivity are factored in, the costs may be much higher than what is estimated [5]. deMutsert and colleagues showed that early adulthood overweight and obesity as measured using BMI is predictive of later adulthood obesity and chronic disease in men [8].

In 2016, Price and colleagues reported that few colleges and universities recognize the importance of the transitional period from high school or home school to college. The transition is cited as a crucial time for critical issues of healthy weight maintenance, stress management, forming healthy behaviors, and the link to future and lifelong obesity prevention, as well as future economic and social implications [9]. In particular, this may be most important for public university campuses that serve a large number of students from populations that suffer disproportionately higher rates of chronic disease and health risk factors such as overweight and obesity.

There is value in examining trends within a specific university setting over multiple years of interest. This study utilized stratified random sampling to assess BMI among undergraduate students at three time periods between 2012 and 2016. Insight into the trends in overweight and obesity among students in one public university population that is diverse with regard to race, ethnicity and income can inform campus-wide health promotion priorities. This information can also guide the development and implementation of health promotion strategies to achieve a healthy weight or prevent the development of overweight or obesity altogether.

Materials and Methods

Population and Sampling

This study took place at one public urban university campus in the Northeast United States. During the years of this study, the campus enrolled approximately 10,500 students; 80% received some type of financial aid; and 40% of the full-time undergraduate student population identified as non-white [10]. Each year of data collection was approved by the university's Institutional Review Board. Data were collected from a representative sample of undergraduate students during the spring semester in 2012, 2014 and 2016. Sampling took place at the course level using random sampling methods, stratified by course level. Professors of selected courses were contacted and

and asked for permission to administer surveys during one of their regularly scheduled class sessions. To ensure anonymity, students placed their own surveys in data collection envelopes. Completed surveys were processed using Scantron readers and converted to data files using SPSS software [11].

Instrumentation

Custom survey questions were created to measure BMI and demographic variables of interest in this study. These questions were developed by the research team and validated through Delphi process with a group of three content experts. Specific questions were as follows:

Body Mass Index (BMI) Category: Students were asked to write in their weight and their height. This information was then used to calculate BMI by dividing body weight in kilograms by height in meters squared. BMI was then categorized according to CDC BMI criteria as underweight, normal weight, overweight or obese [4].

Age: Students were asked to write in their age (in years).

Gender: Students selected between a choice of male, female, and transgender.

Year in college: Students selected freshman, sophomore, junior, or senior.

Data Analysis Procedures

Data were cleaned prior to analysis: students who were not

undergraduate students or did not provide their height or weight to calculate BMI were excluded. Descriptive statistics for each variable were estimated (counts and percentages for categorical variables, means and standard deviations for continuous and normally distributed variables). For each group, data were analyzed to determine whether there were significant differences in BMI category over the 4-year period of this study. The Spearman Rank Order correlation was used to examine trends in BMI across years for each group using a significance level of $p < .01$. Data were managed using SPSS version 19.0 [11], and all analyses were performed using Stata 14.0 [12].

Results

Table 1 provides a description of participant demographic characteristics for each year of data collection, close to three thousand female and male students participated. The majority of students captured in the survey were females (68.3% in 2016) and between 18 – 20 years of age (51.5% in 2016). The average BMI increased from 24.6 (SD=4.9) in 2012, to 24.8 (SD=5.2) in 2014, up to 25.5 (SD=6.08) in 2016 (see table 2). Specific groups that experienced a significant increasing trend in BMI in Table 2 included males ($rS = 0.099$, $p = 0.002$), females ($rS = 0.078$, $p < 0.001$), and students in their sophomore ($rS = 0.129$, $p < 0.001$) and senior years of study ($rS = 0.074$, $p = 0.034$).

	2012 (N=810)		2014 (N=1,238)		2016 (N=856)	
	n	%	n	%	n	%
Gender						
Female	538	66.4	837	67.6	585	68.3
Male	272	33.6	401	32.4	271	31.7
Age						
18 - 20 years of age	485	56.1	631	50.4	417	51.5
21 - 25 years of age	324	37.5	542	43.2	345	42.6
Over 25 years of age	55	6.4	80	6.4	48	5.9
Year in School						
Freshman	225	26.0	239	18.9	181	22.6
Sophomore	210	24.3	286	22.7	163	20.4
Junior	242	28.0	329	26.1	223	27.9
Senior	187	21.6	408	32.3	233	29.2
BMI Category						
Underweight	28	3.2	44	3.5	25	2.9
Normal weight	530	61.3	728	57.6	447	51.2
Overweight	214	24.8	330	26.1	262	30.0
Obese	92	10.7	163	12.9	139	15.9

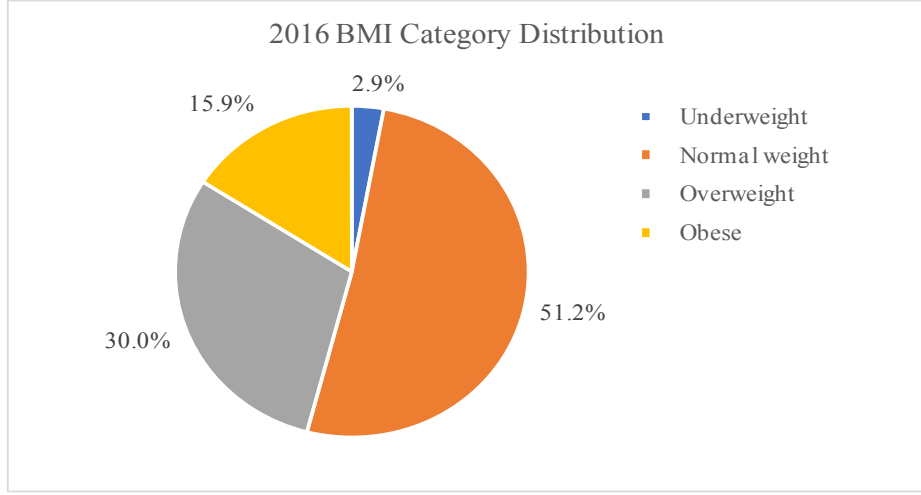
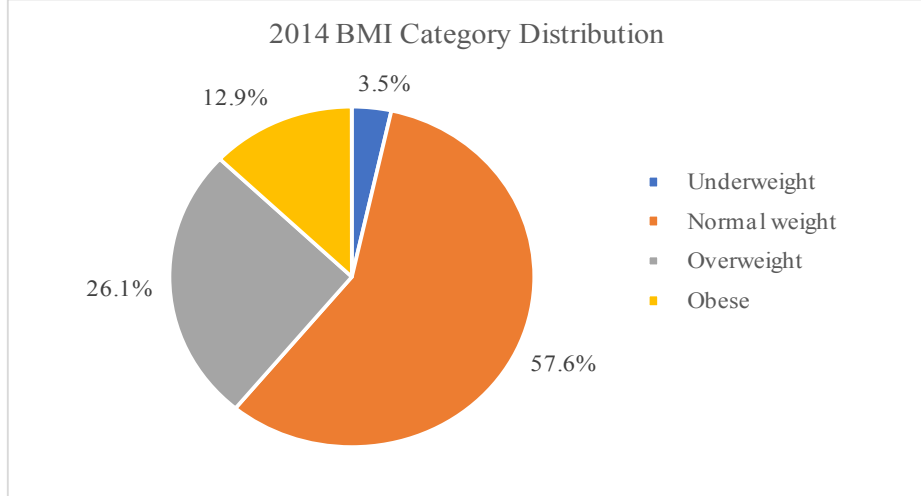
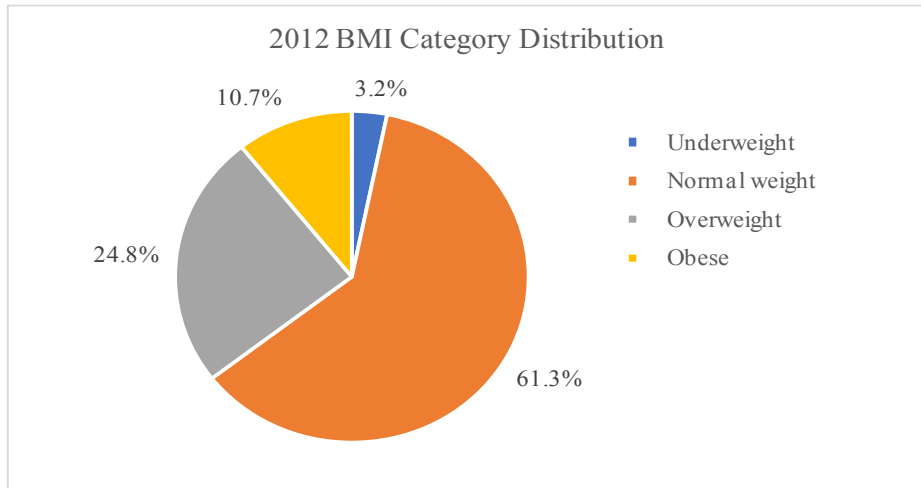
Table 1: Description of Samples (2012 – 2016)

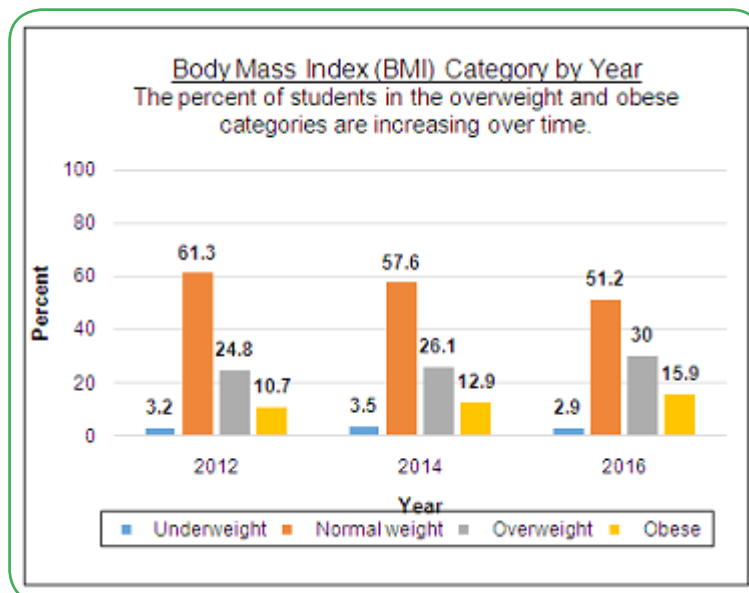
	Spearman's Correlation Results	
	rs	p
Gender		
Female	0.078	0.001*
Male	0.099	0.002*
Age		
18 - 20 years of age	0.046	0.0725

Table 2 to be Cont.....

21 - 25 years of age	0.086	0.0028*
Over 25 years of age	0.058	0.4334
Year in School		
Freshman	0.039	0.3259
Sophomore	0.129	0.001*
Junior	0.017	0.6397
Senior	0.074	0.034*
*-notes statistical significance		

Table 2: Trends in BMI using Spearman’s Correlation Results





Discussion

Gender

Both males and females exhibited a statistically significant increase in BMI over the course of the study, which reflects the national and global data [1-3, 5]. In fact, female students' BMI increased more than males during this time span. These findings also suggest that future studies should examine gender differences on college campuses to design future gender-specific interventions.

Age/Years in College

Students between the ages of 21 and 25 had a significant increase in BMI in comparison to the other age groups. These data suggest that the students who classify themselves as being in some stage of their senior year (i.e., those "super seniors") are experiencing other stressors that might affect their weight [13, 14]. This trend could also suggest that increasing empty calorie consumption occurs in this age group (21 years and older) since this is the legal alcohol access age, thus potentially leading to increased BMI [14]. Further studies that research age and years in college as a significant factor in college students and overweight and obesity are needed.

In looking at the year in college data, the statistically significant trend seen in the sophomore year may reflect the effects of what has been cited throughout years of literature as the "freshman fifteen." The "freshman fifteen" is commonly referred to as weight gain experienced by freshmen during their first year of college; some say that it is a sign of emotional distress in dealing with the transition to college from high school [15]. In our study, we are potentially capturing the increased weight gain from the freshman year in the sophomore year due to when the survey is conducted.

Strengths/Limitations

Strengths of this study include a large sample size and a random selection of research participants, which represents an accurate reflection of the student population. Another strength of the study is that the sample allows for comparison across the years; however, this data is repeated cross-sections of the university population. This study is limited due to the use of self-reported measures for the variables of height and weight used to calculate BMI [16]. In the most recent year of the study (2016), commuter status, race and ethnicity were not collected, making it impossible to evaluate trends based upon these student characteristics. Finally, data were collected at one public university in the Northeast United States and, although a probability sample was used that is representative of undergraduate students on this campus, these results may not be generalizable to undergraduate students at other universities or other adults in this age group.

Conclusion

In Sparling's (2007) campus obesity article, a call to action was issued for all college administration to make a difference in the lives of young college students [17]. Unfortunately, there is no reason to think that the trends of increasing BMI will be significantly reversed without intervention. The life course approach to chronic disease epidemiology states that the earlier a person is exposed to a risk factor for a chronic disease, the greater the likelihood that these biologic changes will result in subsequent disease development [18]. Overweight and obese college students are at a crucial transitional stage to be able to create new habits and undo old habits. In light of this, public universities are prime environments to assist their students with establishing lifelong behavioral interventions and modifications in obesity prevention [9, 19].

Competing interests: 'The author(s) declare that they have no competing interests.'

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