

Changes in Weight and Health Behaviors from Freshman through Senior Year of College

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ABSTRACT

Objective: To assess weight changes, exercise and diet behaviors among college students from the beginning of freshman year until the end of senior year.

Design: Longitudinal observational study.

Setting: Private university in St. Louis, Missouri.

Participants: College students (138 females, 66 males).

Main Outcome Measures: Weight and height were measured, body mass index (BMI) was calculated, and exercise and dietary behaviors were assessed by questionnaire.

Analysis: Changes in weight, BMI, exercise, and dietary patterns from the beginning of freshman year to the end of senior year.

Results: Females gained 1.7 ± 4.5 kg (3.75 ± 9.92 lb) [mean \pm SD] from freshman to senior year, and males gained 4.2 ± 6.4 kg (9.26 ± 14.11 lb) (both $P < .001$). Weight changes were highly variable between students, however, ranging from -13.2 kg to $+20.9$ kg (-29.10 to $+46.08$ lb).

Conclusions and Implications: Weight gain was common but variable among college students. Importantly, exercise and dietary patterns did not meet the recommended guidelines for many college students, which may have long-term health implications.

Key Words: body mass index, exercise, physical activity, diet, students

(*J Nutr Educ Behav.* 2008;40:39-42)

INTRODUCTION

The national importance of student health on college campuses is evident in *Healthy Campus 2010*,¹ a companion document to *Healthy People 2010*² that contains more than 200 health objectives toward which America's colleges and universities should strive. Physical activity and overweight/obesity are 2 of the leading health indicators, yet data from the National College Health Assessment³ and the College Health Risk Behavior Survey^{4,5} indicate that physical activity and dietary patterns of many college students do not meet the recommendations of health professionals, and

29.9% of students are overweight or obese based on self-reported height and weight values.

The greatest increase in overweight and obesity has been observed between 18 and 29 years of age,⁶ the age range of more than 10 million full-time college students in the United States.⁷ Because the nation is moving further away from, rather than toward, the body mass index (BMI) goals established in *Healthy People 2010*,² it is important to understand the influence that college life has on this trend.

Whether college life promotes substantial and inappropriate weight gain is controversial, and some authors state that their data "verify" the "freshman fifteen" phenomenon of weight gain,⁸ whereas others describe the "freshman fifteen" as a "myth."⁹ Few studies have assessed weight changes beyond freshman year,^{10,11} and it is not clear whether any studies have followed students longitudinally through senior year. Given the escalating rates of obesity and inactivity among all ages, it is important to determine whether the prevalence of overweight and obesity increases during college. Therefore, the purpose of this study was to assess changes in body weight and BMI from the beginning of freshman year to the end of senior year of college.

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This work was supported by the Washington University College of Arts and Sciences, the Washington University School of Medicine Program in Physical Therapy, and the Longer Life Foundation Grant #2003-002.

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doi: 10.1016/j.jneb.2007.01.001

DESCRIPTION OF THE EVALUATION

The research design was a prospective, longitudinal, observational study involving a convenience sample of undergraduate students, as described previously.¹¹ Freshman students attending Washington University in St. Louis, Mo were invited to participate in this study when they arrived on campus in August of their freshman year in either 1999 or 2000. Recruitment strategies included announcements mailed to students via campus mail or electronic mail, flyers posted in freshman residence halls, and verbal communication from residence hall resident advisors. Eligible students were at least 18 years of age with BMI at least 18.0 kg/m² (39.68 lb/3.28 ft²). As an incentive to participate, students were given either a gift certificate to the campus bookstore or cash of equal value. The study was approved by the Human Studies Committee of Washington University School of Medicine. Signed, informed consent was obtained from each participant.

Assessments were conducted during the first 2 weeks of the fall semester of freshman year, and during the final 2 to 3 weeks of the spring semester of senior year. Height was measured with a stadiometer to the nearest 0.1 cm (.328 in), and body weight was measured on a balance scale to the nearest 0.1 kg (.2205 lb) (without shoes, hats, outer garments or belts, and with pockets emptied). Body mass index was calculated as weight divided by height squared (kg/m²). The adult BMI criteria¹² were used to categorize students as underweight, normal weight, or overweight/obese, because the Centers for Disease Control and Prevention BMI-for-age growth charts¹³ do not apply to 22-year-old college seniors.

A demographic questionnaire was used to obtain information on self-reported sex, race, ethnicity, and type of residence (eg, residence hall, apartment). Demographic information for all freshman students entering Washington University was obtained from the registrar's office, confirming that the sample was representative of this institution. The exercise and diet questionnaires were based on the transtheoretical model of behavior change.^{14,15} The exercise questionnaire was used to determine whether participants performed aerobic, strengthening, and stretching exercises on a regular basis using the following criteria based on the American College of Sports Medicine guidelines¹⁶: aerobic exercise 3 to 5 days per week, 20 to 60 minutes per day; strengthening exercises 2 or 3 days per week, 8 to 10 repetitions per day for the largest muscle groups; and stretching exercises 2 or 3 days/week. The diet questionnaire was used to assess whether students were meeting the guidelines established by the 5 A Day campaign¹⁷ to eat at least 5 fruits and vegetables daily; limiting intake of fried foods to a maximum of 2 times during the previous week; and limiting high-fat fast foods to a maximum of 2 times during the previous week.

Statistical analyses were performed using SPSS statistical software (version 11.01, 2001, SPSS Inc., Chicago, Ill). Simple descriptive statistics were used to describe the over-

all characteristics of the sample; differences between females and males were examined using either 2-sample t tests (for continuous variables) or chi-square tests (for categorical variables). Changes in outcome measures from the beginning of freshman year to the end of senior year were evaluated using paired samples t tests (for continuous variables) and McNemar's change test (for categorical variables). Results are presented as mean \pm SD. Significance was accepted at an alpha level of .05.

FINDINGS

Two hundred four students (68% female, 32% male, 18 \pm 0 years) completed assessments at both time points and are included in these analyses. Ninety-seven of the 204 students were from the freshman class enrolled in 1999, and 107 were from the freshman class enrolled in 2000. Because the characteristics of the 2 cohorts were not different, their data were combined in all analyses. The racial/ethnic distribution was 75% Caucasian, 11% Asian, 6% African American, 3% Hispanic, and 5% of other or unknown background.

As freshmen, 5% of participants were classified as underweight, 80% were normal weight, and 15% were overweight or obese. By the end of senior year, the prevalence of overweight/obesity increased to 23% ($P = .004$ relative to freshman year). The BMI categorizations for females and males are shown in the Figure. As shown in the Table, weight, height, and BMI increased ($P < .001$) among both females and males from freshman to senior year. The weight changes were highly variable between students, however, ranging from a loss of 13.2 kg (29.10 lb) to a gain of 20.9 kg (46.08 lb).

As freshmen, 59% of students engaged in aerobic exercise regularly, 45% in strengthening exercises, and 31% in stretching exercises; 29% of students did not exercise reg-

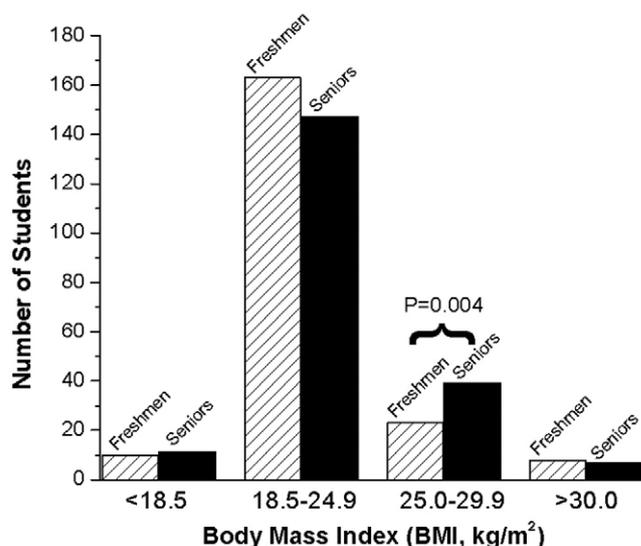


Figure 1. Body mass index (BMI) categories for students at the beginning of freshman year (striped bars) and at the end of senior year (solid bars).

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