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The ‘freshman 15’: Trends and predictors in a sample of multiethnic men and women

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Abstract

This study focused on predictors of the ‘freshman 15’ phenomenon among university students. Participants ($N = 390$) included men and women who identified as African American (32%), Latino American (27%), and European American (41%). Students gained on average 3.2 pounds and 0.5 in BMI from their first through third semesters. Changes in weight and BMI did not differ by gender or racial/ethnic group. Students with lower Scholastic Aptitude Test (SAT) scores were more likely to experience the ‘freshman 15’. Results suggest that universities should work with students who may be underprepared for college in order to minimize weight gain.

Keywords

freshman 15; weight; college students; gender; race/ethnicity

1. Introduction

Many students are familiar with the ‘freshman 15’ (Graham & Jones, 2002), or the belief that students gain 15 pounds during their first year of college. If students do gain a significant amount of weight—whether 15 pounds or less—it is important to identify which students are at greatest risk. Based on previous research, we expect that demographic characteristics, such as gender and race/ethnicity may be relevant to weight gain (Cluskey & Grobe, 2009; DeBate, Topping, & Sargent, 2001). Students’ attitudes toward their bodies and their academic experiences may contribute to weight gain as well (Provencher et al., 2009). In the current study, we add to the literature by examining changes in weight and BMI in a sample of traditional age male and female college students from different racial/ethnic backgrounds during the first three semesters at college. We also examine

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psychological and academic predictors of weight gain that have implications for intervention, while controlling for gender, race/ethnicity, and SES.

College is the first time of independence for many students when they must make their own decisions about eating and physical activity. Thus, weight gain and obesity are important issues for college students. Nearly 32% of North American college students are overweight or obese, with the average body mass index (BMI) in the upper range of normal (normal is defined as 18.5 to 24.9; American College Health Association, 2009; Centers for Disease Control and Prevention[CDC], 2010a; Gillen & Lefkowitz, 2006; Miller et al., 2000). Further, the rate of weight gain in beginning college students is higher than that found in the general population (Levitsky, Halbmaier, & Mrdjenovic, 2004; Mihalopoulos, Auinger, & Klein, 2008). There is less research on weight change beyond the first year, although there is some evidence that weight gain continues into the second year (Lloyd-Richardson, Bailey, Fava, Wing, & Tobacco Etiology Research Network, 2009), and modestly into the last year of college (Racette, Deusinger, Strube, Highstein, & Deusinger, 2008). If students continue to gain weight later in college and after graduation, rates of overweight and obesity will increase. Overweight and obesity increase the risk for a number of health conditions, such as coronary heart disease, type 2 diabetes, and certain cancers (CDC, 2010b).

A number of studies have focused on changes in weight during the early part of college. A recent meta-analysis (Vella-Zarb & Elgar, 2009) and review (Crombie, Ilich, Dutton, Panton, & Abood, 2009) of the freshman 15 literature show overall average gains of 3.86 and 4.4 pounds, respectively. Although college men have higher BMIs than their female counterparts (Cluskey & Grobe, 2009; Gillen & Lefkowitz, 2006; Miller et al., 2000), previous research is mixed on whether they are more likely to gain weight. One study of mostly first and second year students found that men gained more weight across the first semester of the university year than did women (Cluskey & Grobe, 2009) but in other work, there were no significant gender differences in weight gain across the first year (Hoffman, Policastro, Quick, & Lee, 2006; Holm-Denoma, Joiner, Vohs, & Heatherton, 2008).

Fewer studies have examined how weight changes by racial/ethnic group across college. Some research shows that African American students have higher BMIs than Latino American and European American students (Gillen & Lefkowitz, 2006); other work shows no racial/ethnic differences in BMI between these groups (Miller et al., 2000). In terms of weight gain, one study tested whether changes in weight and BMI varied by gender and race/ethnicity (predominantly European American, Asian and Latino American) across the first year of college and found no group differences (Hoffman et al., 2006). Work on the general population of young adults (ages 18 – 30), however, suggests that African Americans gain more weight over a 5-year period than European Americans (Burke et al., 1996).

Some work has also examined changes in BMI, an index that accounts for both weight and height. In general, findings are similar to those for weight, in that there are small increases in BMI across the transition to college (Delinsky & Wilson, 2008; Hoffman et al., 2006; Holm-Denoma et al., 2008; Levitsky et al., 2004; Morrow et al., 2006; Provencher et al., 2009). Specifically, BMI increases 0.7 points across the first semester (Levitsky et al., 2004), and 0.4 to 0.5 points across the first year (Hoffman et al., 2006; Morrow et al., 2006). One study found no gender or ethnic differences in BMI change across the first year of college (Hoffman et al., 2006).

1.1. Predictors of Gaining 15 or More Pounds

In addition to gender and race/ethnicity, other predictors of weight gain are critical. Understanding these other factors helps to identify which students are at risk, and also

suggests points for intervention in ways demographic variables cannot. In the current study, we examine psychological and academic factors that may increase risk for weight gain across the early part of college.

First, we examine body image as a psychological predictor of the ‘freshman 15.’ In a prior study, women who experienced the ‘freshman 15’ were more dissatisfied with their bodies and had a stronger drive for thinness than women who did not gain 15 pounds (Provencher et al., 2009). Yet in another study, there was no association between body image, as measured by figure drawings, and weight change (Holm-Denoma et al., 2008). In the current study, we examine appearance evaluation, a different aspect of body image that assesses views about appearance in general. Students who have less positive evaluations of their appearance may be more willing to engage in risk behaviors that can harm the body (e.g., eating unhealthy foods, binge drinking), behaviors that may, in turn, lead to weight gain.

Second, we examine academic experiences because they may also contribute to the ‘freshman 15.’ Previous work has focused on aspects of the ecological transition to college, such as feelings about the transition and residential status (Provencher et al., 2009). In addition to these factors, involvement in campus organizations may be important. Individuals who are more involved with student organizations may be more physically active through their participation in these groups’ events (e.g., sports teams, volunteer activities). They may also feel more integrated into the campus community. For example, DeNeui (2003) found that first year students who participated in more campus activities had a higher psychological sense of community during second than first semester as compared to those who participated in fewer activities. Involvement in campus groups may reduce feelings of isolation, and subsequently, overeating. Academic aptitude may be linked to weight gain as well. Students who have lower academic aptitude may be underprepared for college, which may lead to stress, overeating, and ultimately, weight gain. To that end, Wolff, Crosby, Roberts, and Wittrock (2000) found that stress and negative moods were associated with binge eating in college women. Further, in a qualitative study of perceived factors that contribute to students’ weight, diet, and physical activity, participants cited lack of time and eating for reasons other than hunger (e.g., stress, while studying) as important contributing factors (Nelson, Kocos, Lytle, & Perry, 2009). In the current study, we use scores from the Scholastic Aptitude Test (SAT), a standardized college admission exam, as an indicator of academic aptitude because they significantly predict first year academic performance (Zwick & Sklar, 2005). We expect that students who are less involved with campus groups and have lower SAT scores will be at greater risk for the ‘freshman 15.’

1.2. Summary and Hypotheses

In sum, research suggests that students tend to experience a small increase in body size during the transition to college. In particular, men and African Americans may gain more weight than women and those from other racial/ethnic groups. In the current study, we build on prior research by testing changes in body size into the second year of college, studying individuals from multiple racial/ethnic groups, and examining predictors of the ‘freshman 15’ that have implications for intervention. Based on previous research, we propose the following hypotheses:

1. Students will gain weight and increase in BMI.
2. Men will gain more weight and have a higher increase in BMI than women.
3. African Americans will gain more weight and have a higher increase in BMI than European Americans and Latino Americans.

4. Students who are male, African American, have poorer evaluations of their appearance, are less involved with campus organizations, and have lower SAT scores will be more likely to gain 15 or more pounds.

2. Method

2.1. Participants and Procedure

We conducted a longitudinal study at a large public university in the Northeastern United States. Early in the first semester of their first year at university, we contacted all Latino American and African American students, and a random 9% of European American students (because 9% approximated the numbers of racial/ethnic minority students contacted) between the ages of 17 and 19 from a list provided by the registrar. Eight-hundred thirty nine students received a letter about the study, and 52% agreed to participate. Participants completed a survey in classrooms in their first (T1- first/fall semester 2002; T2- second/spring semester 2003), and second (T3- third/fall semester 2003) years.

The sample sizes at each time point were: T1 ($N = 434$), T2 ($N = 414$), and T3 ($N = 390$), yielding a 90% retention rate. Data analyses are on the 390 students who completed surveys at all time points.

2.2. Measures

2.2.1. Weight and BMI—Participants reported their weight in pounds and their height in inches. We calculated their BMI from these data using the CDC (2010a) formula. In adolescents, BMI calculated from self-reported height and weight is highly correlated with BMI from measured height and weight ($r = .92$; Goodman, Hinden, & Khandelwal, 2000). We use weight and BMI as dependent variables. Although these variables are highly correlated, we include them both. Specifically, we include weight to test the ‘freshman 15’ idea, and BMI because it is used to measure overweight and obesity (CDC, 2010c). Other work on the ‘freshman 15’ includes both variables as well (e.g., Hoffman et al., 2006; Mihalopoulos et al., 2008).

2.2.2. Mother’s education—We used mother’s education as a proxy for socioeconomic status, similar to prior work on adolescents (Rauscher & Myers, 2008; Ridolfo & Maitland, 2011). Mother data may better capture SES in individuals from single-parent families than father data, given that many custodial parents are women (Grall, 2009). In our sample, approximately 1/3 of students reported that their parents were not married to each other.

Participants were asked to indicate their mother’s level of education using a 9-point scale including: 1 = less than 7th grade, 2 = 7th – 9th grade (junior high), 3 = 10th – 11th grade (partial high school), 4 = high school graduate, 5 = some college, no degree, 6 = vocational/technical training, 7 = associate’s degree, 8 = bachelor’s degree from college, and 9 = graduate or professional degree.

2.2.3. Predictors of the ‘freshman 15’—We used the appearance evaluation subscale from the Multidimensional Body-Self Relations Questionnaire (MBSRQ; Cash, 2000) to assess body image. Appearance evaluation measures evaluation of overall physical appearance and has 7 items (e.g., ‘I like the way I look without my clothes on’). Responses range from 1 = definitely disagree to 5 = definitely agree. Reliability ($\alpha = .88$) was satisfactory and similar to that reported by Cash (2000).

To assess involvement in campus groups, we asked students to describe any clubs, organizations, teams, or fraternities/sororities on campus (a) they had joined and (b)

attended the meetings of (if they had not joined). We then created a variable that represents the summed total of these responses (number of groups students had joined + number of groups students had attended the meetings of if they had not already joined).

To measure SAT scores, we asked students to recall their scores on the quantitative and verbal sections of this test. Based on their responses, we calculated their total score (maximum total combined score = 1600). In all analyses, we divided SAT scores by 10. SAT scores can only increase in increments of 10 points; dividing by 10 changes these increments to 1 point, making results more interpretable. Descriptive statistics for all variables are presented in Table 1.

2.3. Plan of Analysis

First, we tested for attrition biases. Second, to address hypotheses 1 – 3, we performed two mixed model ANOVAs with time as a within-person factor, and gender and race/ethnicity as between-person factors. In the first mixed model ANOVA, weight was entered as a dependent variable, and in the second, BMI was the dependent variable. Third, to address hypothesis 4, we performed a logistic regression to examine predictors of gaining 15 or more pounds from T1 to T2. This analysis allows us to understand which students are at greatest risk for the ‘freshman 15.’ Because students tend to gain more weight earlier, rather than later, in the school year (Holm-Denoma et al., 2008), we chose to examine factors that predict change from T1 to T2.

3. Results

3.1. Attrition Analyses

To check for attrition biases, we performed two chi-squares and six *t*-tests. There were gender ($\chi^2(1, 434) = 8.1, p < .01$) and racial/ethnic ($\chi^2(2, 434) = 7.3, p < .05$) differences in study participation. Specifically, those who were no longer in the study at T3 were more likely to be male and Latino American or African American. Those who dropped before T3 and those who were in all three time points did not differ on weight, BMI, appearance evaluation or involvement in campus groups. However, those who were not in the study by T3 had mothers with lower levels of education ($t = 2.4, p < .05$) and lower SAT scores ($t = 2.4, p < .05$) than those who were in all three time points.

3.2. Changes in Weight

In the first mixed model ANOVA with weight as the dependent variable, results show main effects for gender, race/ethnicity, and time (see Table 2). Men weighed an average of 34.5 pounds more than women. To follow up on the significant effect for race/ethnicity, we performed Tukey tests, which revealed that African Americans weighed an average of 16.1 pounds more than Latino Americans ($p < .001$) and an average of 15.8 pounds more than European Americans ($p < .001$). To follow-up on the significant time effect, we conducted simple contrast tests, with T1 as the reference category. Results show that weight at T2 and T3 was significantly higher than weight at T1 ($ps < .001$). On average, students gained 2.6 pounds from T1 to T2 and 0.6 pounds from T2 to T3. Change in weight was greater from T1 to T2 than from T2 to T3 ($t = 2.96, p < .01$). Thus, our first hypothesis that students would gain weight was supported, but interactions between time and gender and time and race/ethnicity were not significant as predicted in hypotheses 2 and 3.

Next, we examine weight gain between time points. We define weight gain as any increase in weight from T1. 56.1% of students gained weight between T1 and T2, 38.0% between T2 and T3, and 56.3% between T1 and T3. Of those who gained weight during a specific period, the average gain from T1 to T2 was 7.37 ($SD = 5.84$) pounds, from T2 to T3 was

8.36 ($SD = 8.29$) pounds, and from T1 to T3 was 9.37 ($SD = 8.12$) pounds. Some students gained 15 or more pounds: 6.7% from T1 to T2, 4.8% from T2 to T3, and 11.8% from T1 to T3.

3.3. Changes in BMI

In the second mixed model ANOVA with BMI as the dependent variable, there were main effects for gender, race/ethnicity, and time (see Table 2). Men ($M = 24.6$) had a higher BMI than women ($M = 23.5$), and African Americans ($M = 25.6$) had a higher BMI than Latino Americans ($M = 23.5$; $p < .01$) and European Americans ($M = 23.1$; $p < .001$). The significant time effect showed that BMI was significantly higher at T2 and T3 than it was at T1 ($ps < .001$). We also examined whether change was greater from T1 to T2, or from T2 to T3. On average, BMI increased by 0.4 points from T1 to T2 and 0.1 points from T2 to T3. The change in BMI from T1 to T2 and from T2 to T3 were not significantly different from one another ($t = 1.53$, $p > .05$). These results support our first hypothesis that BMI would increase, but do not support the second and third hypotheses in which we predicted interactions between time and gender, and time and race/ethnicity.

3.4. Predictors of the 'Freshman 15'

In the logistic regression predicting the 'freshman 15', we entered gender, African American race/ethnicity (1 = African American, 0 = Latino American, European American), mother's education (as a proxy for SES), and T1 weight as controls in Step 1. In Step 2, we entered the predictors: appearance evaluation, involvement in campus organization(s), and SAT scores. All predictor variables were assessed at T1. A test of the full model was significant $\chi^2(7) = 14.01$, $p = .05$ (see Table 3). SAT scores were a significant predictor. For every 10 point increase in reported SAT score, the odds of experiencing the 'freshman 15' decreased by 3%. Involvement in campus groups marginally predicted the 'freshman 15.' For every campus group students were involved with, the odds of experiencing the 'freshman 15' decreased by 28%.

4. Discussion

In the current study, we examined changes in weight and BMI across the transition to college among men and women who identified as African American, Latino American, and European American. In support of our hypotheses and similar to prior work, results show that students tend to gain weight in the early part of college (Crombie et al., 2009; Vella-Zarb & Elgar, 2009). On average, students gained more than 3 pounds and increased in BMI by $\frac{1}{2}$ point from the first through third semesters. Nearly 12% of students gained 15 pounds or more. Students gained more weight during the earlier part of this transition period than the latter, similar to prior work (Holm-Denoma et al., 2008). Thus, many students gain a little weight, particularly during the first semester, and a smaller group experiences the 'freshman 15.'

There are several possible explanations for this weight gain, and there are likely individual differences in underlying causes. Weight gain may be due to normal growth and maturation, particularly for men who tend to develop later than women, or to an inconsequential fluctuation in weight. Or, weight gain may represent a meaningful increase in adiposity, which may be facilitated by aspects of the transition to college. Many students are living without parental supervision for the first time and thus must make independent health-related decisions. Some students may have difficulty maintaining or incorporating physical activity into their new daily routines. For example, compared to high school students, fewer college students are members of an organized sports team (Eaton et al., 2010; Ward & Gryczynski, 2007). Another health challenge is establishing a healthy diet. Students perceive

access to unhealthy food choices on campus, such as fast-food and dining halls that offer unlimited portion sizes (Cluskey & Grobe, 2009). Given these health challenges, it is not surprising that students tend to gain weight when they go to college, especially in the earlier part of this transition period when they also encounter new academic demands and peer groups.

Although men and African Americans weighed more and had larger BMIs than women and members of other racial/ethnic groups, respectively, their weight and BMI did not show different patterns of change. These results were contrary to our hypotheses and some prior work (Burke et al., 1996; Cluskey & Grobe, 2009; DeBate et al., 2001). Because they all attended the same university, all students in this study may have experienced similar ecological changes during their transition to college, such as new peers, food choices, and drinking cultures. These issues are health challenges for everyone, regardless of gender or race/ethnicity.

Students with lower SAT scores had a greater likelihood of experiencing the ‘freshman 15.’ These individuals may be less prepared for the academic demands of college, which can lead to stress, and ultimately, unhealthy eating practices. These students may also lack the time management skills needed to set aside time for physical activity. Also, less involvement in campus organizations marginally predicted the ‘freshman 15.’ Although we interpret these results with caution, we suggest that campus organizations offer opportunities to engage in physical activity and socialization. Students who are less involved in these groups may be more sedentary and make poorer food choices due to feelings of disengagement from campus life. It is noteworthy that initial body size did not significantly predict the ‘freshman 15’, indicating that students of all body sizes were equally likely to experience this phenomenon.

This study has some limitations. There were attrition biases by gender, race/ethnicity, mother’s education, and SAT scores which could affect the longitudinal results. The findings highlight experiences for students at institutions with a predominantly European American population. There may be different patterns of change by racial/ethnic group at universities with different racial/ethnic compositions. It is also important to note the low effect sizes in models examining change over time in weight and BMI. Unmeasured variables may explain more variance in these outcomes. Finally, we used self-reported height, weight, and SAT scores which may not correspond to actual values, as students may show a social desirability bias when reporting these scores.

In spite of these limitations, this study contributes to the literature in important ways. We examined changes in weight and BMI in a racially/ethnically diverse sample of students into the second year of college. Overall, results refute the universality of the ‘freshman 15’ but do suggest that students gain a small amount of weight when they go to college, especially in the earlier part of this transition. Weight gain was consistent across gender and racial/ethnic groups, suggesting that the ecological challenges of the college environment affect students from these groups in similar ways.

These findings have implications for intervention. Universities should target all gender and racial/ethnic groups in intervention programs that aim to minimize weight gain, given that patterns of weight change are similar across groups. In addition, academic support systems, such as tutoring or mentoring programs, should be implemented for incoming students with lower SAT scores. In turn, these students may feel less isolated and overwhelmed and learn important skills for managing a healthy lifestyle. Although preliminary, findings also suggest that universities should promote involvement in campus groups to reduce weight gain. Future studies should follow up on this marginal finding.

Other future directions for research include measuring other academic predictors of weight gain, such as college GPA, types of student clubs, and satisfaction with campus life. Research should also focus on changes in weight-related behaviors and attitudes, such as eating behavior and body image. These studies should continue beyond the second year. Students encounter new experiences in the latter part of college which may shape their health habits, and in turn, their weight. If weight gain continues beyond the second year students are at increased risk for overweight and obesity, and ultimately, serious health problems (CDC, 2010b).

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Highlights

- College students gained on average 3.2 pounds from their first through third semesters.
- Nearly 12% of students gained 15 pounds or more.
- Changes in weight and BMI did not differ by gender or racial/ethnic group.
- Students with lower SAT scores were more likely to gain 15 or more pounds.

Table 1

Descriptive statistics on all variables

Variable	%
% female	54
% African American	32
% Latino American	27
% European American	41
<i>M (SD)</i>	
Age	19.5 (0.4)
SES (mother's education)	6.6 (2.0)
Appearance evaluation	3.5 (0.8)
Number of campus organizations joined/attended meetings of	1.5 (1.4)
Scholastic Aptitude Test (SAT) scores	1134.8 (144.1)

Note. Due to missing data, sample size ranged from $N = 361$ to 390 . Age range is 18.5 to 20.8 years. Response options for mother's education include: 1 = less than 7th grade, 2 = 7th – 9th grade (junior high), 3 = 10th – 11th grade (partial high school), 4 = high school graduate, 5 = some college, no degree, 6 = vocational/technical training, 7 = associate's degree, 8 = bachelor's degree from college, and 9 = graduate or professional degree. Scores on appearance evaluation represent individuals' average across items (1 = definitely disagree to 5 = definitely agree). Actual scores on number of campus organizations joined/attended range from 0 to 8. SAT scores range from 670 to 1460.

Table 2

Mean scores on weight and BMI at Times 1, 2, and 3

	T1 M (SD)	T2 M (SD)	T3 M (SD)	F (gender)	F (race/ethnicity)	F (time)
Weight				109.9***	10.5***	26.5***
Total sample	153.4 (36.4)	156.0 (36.0)	156.6 (37.1)			
Men	172.3 (35.5)	174.7 (34.6)	175.2 (35.6)			
Women	137.4 (28.7)	140.3 (29.1)	141.0 (30.6)			
AA	164.1 (42.6)	167.1 (42.3)	168.4 (43.7)			
LA	146.8 (33.3)	149.6 (33.5)	150.5 (34.6)			
EA	149.5 (31.2)	151.9 (30.3)	151.8 (30.8)			
BMI				6.8**	12.2***	15.7***
Total sample	23.6 (4.5)	24.0 (4.4)	24.1 (4.5)			
Men	24.4 (4.5)	24.6 (4.3)	24.7 (4.5)			
Women	23.0 (4.3)	23.5 (4.4)	23.6 (4.6)			
AA	25.2 (5.3)	25.5 (5.4)	25.8 (5.6)			
LA	23.1 (3.8)	23.6 (3.8)	23.6 (3.9)			
EA	22.8 (3.9)	23.1 (3.6)	23.2 (3.6)			

Note. Weight is in pounds. Due to missing data, sample size ranged from $N = 369$ to 372. AA = African American, LA = Latino American, and EA = European American. Effect sizes (η^2) for the F s are: Weight—gender (.23), race/ethnicity (.05), time (.07), and BMI—gender (.02), race/ethnicity (.06), time (.04). The two- and three-way interactions between time, gender, and race/ethnicity were never significant and therefore are not reported.

**
 $p \leq .01$,

 $p \leq .001$

Table 3

Logistic regression predicting a 15+ pound weight gain from T1 to T2

Variable	B	SE B	Wald X ²	Odds Ratios
Step 1				
Gender	−.29	.49	.35	.75
African American	.72	.44	2.7	2.1
Mother's education	−.09	.10	.73	.92
T1 weight	.00	.01	.00	1.0
Step 2				
Gender	−.65	.54	1.4	.52
African American	.40	.50	.65	1.5
Mother's education	−.02	.11	.03	.98
T1 weight	−.00	.01	.07	1.0
T1 appearance evaluation	−.44	.29	2.3	.64
T1 involvement in campus organization(s)	−.33	.19	2.9 [^]	.72
SAT scores	−.04	.02	5.1 [*]	.97

Note. Sample size was $N = 348$. All predictors were measured at T1.

[^]
 $p = .09$,

^{*}
 $p < .05$.