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Body Mass Index and Educational Inequality: An Update of Crandall (1995)

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Over 2 decades ago, social psychological research revealed that weight stigma may undermine educational achievement. This study documented that a greater proportion of college students were thin compared with the general population and that heavier females received less college financial support from parents than thinner females (Crandall, 1995). Although frequently cited, there is no current literature on these phenomena despite major changes since the 1990s including a much higher prevalence of obesity and the economic downturn known as the “Great Recession.” Thus, in the interest of pursuing replicable science, the present study examined the role of weight stigma in higher education in 2 studies using ethnically diverse samples of first-year college students. We found that the average Body Mass Index (BMI) and BMI distribution in our samples were still significantly lower than a nationally representative sample, regardless of gender and ethnicity. We also found that, among females, self-funded students had higher BMIs than parent-funded students. In one sample, this was also the case for males. Together these findings suggest that not only are heavy young adults perhaps less likely to be in college than their thin counterparts, but they may also receive less support from their parents. This points to the possibility that weight stigma may undermine educational achievement in today’s youth, which could have negative downstream consequences for lifelong socioeconomic, health, and well-being outcomes.

Keywords: weight stigma, weight discrimination, Body Mass Index, education disparity, higher education

In 1995, research findings from a 1991 dataset made headlines with alarming results (Crandall, 1995): parents provided less financial support for college for heavier daughters compared with thinner daughters. Moreover, the article reported that college students, on average, were significantly thinner than the general population. These findings carried with them important implications, documenting how weight stigma can occur even within families and how this stigma may contribute to educational dis-

parities, disadvantaging heavier students in their education pursuits. This is particularly problematic as it can set the stage for future disparities in employment opportunities, socioeconomic factors, health, and quality of life.

Over the past two decades, Crandall (1995) has been cited nearly 300 times as the burgeoning literature on weight stigma continues to grow. However, since then, many societal changes have occurred, warranting a reexamination of the reported phenomena within the current generation of students. For instance, from the early 1990s to the mid-2010s, rates of obesity among adolescents doubled from roughly 10 to 20% (Ogden et al., 2016). Along with that, weight stigma is also rising in prevalence (Andreyeva, Puhl, & Brownell, 2008). This means millions are at risk for being targets of weight stigma. In addition, in the early 2000s, the United States experienced the substantial economic downturn termed the “Great Recession,” which influenced how students fund their college education. Namely, although college enrollment has increased, state budgeting changes have shifted college payment sources from public subsidies to personal funding (Barr & Turner, 2013). Therefore, it is timely for the abovementioned findings to be reexamined in the current generation and societal climate post-Great Recession.

In updating the Crandall (1995) findings in today’s society, the current research also aimed to expand upon the original study design to strengthen the validity and generalizability of the results. As such, while the original study recruited only White students, we

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targeted a more ethnically diverse sample of college students. Additionally, for our nationally representative comparison sample, we used data exclusively from individuals contemporary in age to our sample (i.e., 18- to 19-year-olds) from the 2005–2012 National Health and Nutrition Examination Survey (NHANES, 2005–2012). This offered a more stringent comparison of college students to the general population, as opposed to using a larger age-range of the NHANES sample. Finally, to bolster the generalizability, we examined these phenomena twice on two different college campuses.

The studies in the present investigation, therefore, had three aims: First, we tested whether college students still weigh less, on average, than individuals of the same age from a nationally representative sample. We then examined how college students' distribution of Body Mass Index (BMI) categories (e.g., "underweight," "normal weight," "overweight," and "obese") differed from the nationally representative sample. We hypothesized that despite societal changes, college students would still be thinner than the general public. Finally, we examined whether heavier female (but not male) college students still receive less financial support for college from their families than thinner students. To do so, we compared students who received funding from their parents as their primary means of paying for college to students who used financial aid or personal funds as their primary means of support. Considering that females tend to experience more weight stigma than men (Puhl & Heuer, 2009), we expected to observe the original study's findings only among females.

Study 1

Method

Participants. Because many students experience weight gain during the first year of college (Wengreen & Moncur, 2009), all participants were recruited and participated during the fall quarter of their freshman year. This allowed for the most proximal measure of their precollege BMI (i.e., their BMI when funding decisions were made). Freshman status was, therefore, a specific inclusion criterion, and transfer students were excluded. Participants received credit toward an undergraduate psychology course requirement in exchange for their participation.

In total, 293 first-year undergraduate students were recruited from the psychology department subject pool of a large, public university in the Western United States. Nine participants declined to have their data used after participating, which resulted in a final sample of 284 (47.5% male, 52.5% female). Sample size was determined based on prior Cohen's d of .451 (Crandall, 1995) to maintain adequate power of .95 to detect group differences in BMI based on source of financial support. The final sample was racially/ethnically diverse, with participants reporting their ethnicity as Asian (34.9%), White (31.3%), Latino/a (18.7%), Black (6.7%), and other (8.5%).

Procedure. The University's Institutional Review Board approved all procedures. After determining eligibility, participants completed the study procedures online using the survey platform Qualtrics to fill out questionnaires. Personal identifiers were col-

lected only for the purpose of granting course credit and removed from the dataset before analyses.

Measures.

Body Mass Index. Participants self-reported both their height in inches and their weight in pounds. BMI was then calculated according to the standard formula, $\text{weight}[\text{lbs}]/\text{height}[\text{in}]^2 \times 703$. BMI categories were determined according to the standard intervals: "underweight" (BMI <18.50), "normal weight" (BMI 18.50–24.99), "overweight" (BMI 25.00–29.99), and "obese" (BMI \geq 30.00).

Source of education funding. Participants indicated their main source of education funding from among the following options taken from Crandall (1995): Scholarship, family, job/personal savings, money held in trust, financial aid, athletic scholarship, or other. We then dichotomized this variable to code those who were parent-funded (i.e., those who selected "family," 50.7%, $n = 144$) and self-funded (i.e., those who selected "job/personal savings" or "financial aid," 37.7%, $n = 107$). The remainder (11.6%) did not fall into either classification.

Comparison values. To compare our sample's BMI and BMI distribution to that of the general population of same-aged individuals, we used data from 18- to 19-year-olds in the 2005–2012 waves of NHANES, a nationally representative study consisting of interviews and physical examinations of the civilian U.S. population. NHANES participants self-report their age, gender, and ethnicity. In NHANES, ethnicity is categorized as Non-Hispanic White, non-Hispanic Black, and Mexican American. Asian is relegated to the "other" category. Our sample, on the other hand, included a unique category for Asian, and our Latino/a category included all participants identifying as Latino/a or Hispanic. Therefore, in analyses, we compared all those identifying as Latino/a from our sample to Mexican Americans from NHANES and all those identifying as Asian from our sample to the "other" category from NHANES.

Demographics. Participants self-reported their sex as male or female and their ethnicity as White, Asian, Latino, Black or other. Participants also reported how many rooms there were in their homes, which was used as a measure of socioeconomic status (SES). This has been used as an index of SES in previous research (Galobardes, Shaw, Lawlor, Lynch, & Davey Smith, 2006; Vyas & Kumaranayake, 2006), particularly with adolescents for whom assessing SES can be especially difficult (Wagner, Ritt-Olson, Soto, & Unger, 2008).

Results

Aim 1: Comparison of Study 1 college student BMI to nationally representative sample. A one-sample t test revealed that the average BMI of the Study 1 student sample was overall significantly lower than the average BMI of the nationally representative comparison sample of 18- to 19-year-olds. Further one-sample t tests compared the average BMI for individual subgroups of the Study 1 student sample (e.g., male, female, White, Latino/a, Asian) to the respective subgroups in the nationally representative sample. Again, across each subgroup, the student sample subgroup had a significantly lower average BMI than the respective nationally representative sample subgroup. See Table 1 for descriptive and test statistics and estimates of effect size.

Aim 2: Comparison of Study 1 college student BMI distribution to nationally representative sample. A χ^2 goodness-of-fit test was conducted comparing the overall distribution of BMI

Table 1
Comparison of Study 1 BMI to Nationally Representative Sample

Group	<i>n</i>	Average BMI	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i> value	Cohen's <i>d</i>	95% CI
Overall				-18.18	283	<.001	1.08	[-4.34, -3.49]
College sample	284	22.62	3.63					
NHANES comparison		26.53						
Male				-13.12	134	<.001	1.13	[-4.01, -2.96]
College sample	135	22.87	3.09					
NHANES comparison		26.36						
Female				-12.97	148	<.001	1.06	[-4.96, -3.65]
College sample	149	22.38	4.05					
NHANES comparison		26.69						
White				-12.51	88	<.001	1.32	[-4.85, -3.52]
College sample	89	22.42	3.16					
NHANES comparison		26.60						
Latino/a ^a				-3.03	52	.004	.42	[-2.81, -.57]
College sample	53	24.48	4.06					
NHANES comparison		26.17						
Asian ^a				-9.70	98	<.001	.97	[-4.21, -2.78]
College sample	99	21.65	3.59					
NHANES comparison		25.15						

Note. BMI = Body Mass Index; NHANES = National Health and Nutrition Examination Survey; CI = confidence interval.

^a In the NHANES sample, Latino/a individuals were only those of Mexican descent. Asian individuals were combined with individuals indicating "other." As less than 7% of the sample reported ethnicity as Black, these tests were not run for this group because of low power.

categories in the Study 1 student sample to the distribution in the nationally representative comparison sample. This test revealed that the student sample had a significantly different distribution of BMI categories compared with the nationally representative sample. Examining the distributions, it appeared that a disproportionate percentage of students had "normal" BMIs. Again, follow-up χ^2 analyses were conducted comparing the BMI category distributions of individual subgroups of the student sample (e.g., male, female, White, Latino/a, Asian) to the distribution of the respective subgroup in the nationally representative sample. These tests all similarly revealed a significantly different distribution in the student sample where, again, it appeared that a disproportionate percentage of students had normal BMIs compared with the respective nationally representative sample subgroup. See Table 2 for distributions and test statistics.

Aim 3: Study 1 BMI difference in parent-funded versus self-funded college students. A one-way analysis of variance (ANOVA) was conducted to compare the average BMI of Study 1 students whose primary source of financial support was parent-based funding to those whose primary source was self-based funding. This test revealed that the average BMI of parent-funded students was significantly lower than the average BMI of self-funded students.¹ The interaction between funding source and sex was nonsignificant, $F(1, 247) = 0.91, p = .342$. However, because Crandall (1995) found this effect only in women, analyses were also stratified by sex to demonstrate simple effects, both of which were significant. See Table 3 for descriptive and test statistics and estimates of effect size.

Study 2

Method

To test the generalizability of the findings reported in Study 1, Study 2 replicated Study 1 in a different college environment. The

methods in Study 2 were identical to Study 1, except that participants in Study 2 were recruited from a large, public university in the Midwestern United States. The university's Institutional Review Board approved all procedures.

In total, 260 first-year undergraduate students were recruited from the psychology department subject pool during the fall semester. One participant declined to have the data used after participating, which resulted in a final sample of 259 (30.1% male, 69.9% female). Sample size was determined to roughly match Study 1. The Study 2 sample was less racially/ethnically diverse than the Study 1 sample, with participants reporting their ethnicity as White (78.8%), Asian (11.6%), Latino/a (4.2%), Black (2.3%), and other (3.1%). Regarding sources of support, 59.1% of the sample ($n = 153$) were classified as parent-funded, and 29.3% ($n = 76$) were classified as self-funded. The remainder (11.6%, $n = 30$) did not fall into either classification.

Results

Aim 1: Comparison of Study 2 college student BMI to nationally representative sample. A one-sample *t* test revealed that the average BMI of the Study 2 student sample overall was significantly lower than the average BMI of the nationally representative comparison sample of 18- to 19-year-olds. Further one-sample *t* tests compared the average BMI for individual subgroups of the Study 2 student sample (e.g., male, female, White, Asian) to the respective subgroups in the nationally representative sample. Again, across each subgroup, the Study 2 student sample subgroup had a significantly lower average BMI than the respective nation-

¹ This effect was maintained when accounting for SES as measured by the number of rooms in the student's home, and there was no significant interaction between funding source and race.

Table 2
Comparison of Sample 1 BMI Distribution to Nationally Representative Sample of 18- to 19-Year-Olds

Group	n	BMI distribution (percentage)				χ^2	df	p value	Cramer's v
		Underweight	Normal weight	Overweight	Obese				
Overall						198.54	3	<.001	.48
College sample	284	9.89	69.01	16.90	4.23				
NHANES comparison		13.35	31.41	27.62	27.62				
Male						119.20	3	<.001	.54
College sample	135	6.67	69.63	21.48	2.22				
NHANES comparison		13.73	28.48	31.53	26.26				
Female						85.81	3	<.001	.44
College sample	149	12.75	68.46	12.75	6.04				
NHANES comparison		12.99	34.21	23.87	28.94				
White						71.33	3	<.001	.52
College sample	89	8.99	73.03	13.48	4.49				
NHANES comparison		8.13	21.81	19.43	18.64				
Latino/a						35.67	3	<.001	.47
College sample	53	3.77	58.49	32.08	5.66				
NHANES comparison		17.36	26.48	28.49	27.68				
Asian ^a						68.77	3	<.001	.48
College sample	99	15.15	74.75	6.06	4.04				
NHANES comparison		16.77	36.38	26.05	20.80				

Note. BMI = Body Mass Index; NHANES = National Health and Nutrition Examination Survey; CI = confidence interval. BMI categories refer to the following intervals: Underweight = BMI < 18.50; Normal weight = BMI 18.50–24.99; Overweight = BMI 25.00–29.99; Obese = BMI ≥ 30.00.

^a In the NHANES sample, Asian individuals were combined with individuals indicating “other.” Latino/a individuals were only those of Mexican descent. As less than 7% of the sample reported ethnicity as Black, these tests were not run for this group because of sparse cells.

ally representative sample subgroup. See Table 4 for descriptive and test statistics and estimates of effect size.

Aim 2: Comparison of Study 2 college student BMI distribution to nationally representative sample. A χ^2 goodness-of-fit test was conducted comparing the overall distribution of BMI categories in the Study 2 student sample to the distribution in the nationally representative comparison sample. This test revealed that the student sample had a significantly different distribution of BMI categories compared with the nationally representative sample. Examining the distributions, it again appeared that a disproportionate percentage of students had normal BMIs. Again, follow-up chi-square analyses were conducted comparing the BMI category distributions of individual subgroups of the Study 2 student sample (e.g., male, female, White, Asian) to the distribution of the respective subgroup in the nationally representative sample. These tests all similarly revealed a significantly different distribution in the student sample, where, again, it appeared that a disproportionate percentage of college students had normal BMIs compared with the respective nationally representative sample subgroup. See Table 5 for distributions and test statistics.

Aim 3: Study 2 BMI difference in parent-funded versus self-funded college students. A one-way ANOVA was conducted to compare the average BMI of Study 2 students whose primary source of financial support was parent-based funding to those whose primary source was self-based funding. This test revealed that the average BMI of parent-funded students was significantly lower than the average BMI of self-funded students.² The interaction between funding source and sex was nonsignificant, $F(1, 225) = 0.44, p = .510$. However, because Crandall (1995) found this effect only in women, analyses were also stratified by sex to demonstrate simple effects. These analyses revealed a significant effect only in females. See Table 6 for descriptive and test statistics and estimates of effect size.

Discussion

In summary, our findings provide evidence of continued weight-related educational disparities at the college level in the United States. Across two studies, college student samples had a lower average BMI and a distribution of BMIs more skewed toward normal weight than a nationally representative sample of 18- to 19-year-olds. This suggests that perhaps a disproportionate number of heavy individuals may not even get to college in the first place or struggle to obtain admissions to top schools. We also found that heavier females may still be receiving less financial support for college from their parents than thinner females. Moreover, in one of our two studies this was also the case for male students.

Together, our results parallel those from Crandall (1995), who attributed this pattern of findings to weight-based discrimination. While this evidence suggests that weight-based discrimination may be associated with educational achievement, it is still unclear whether the relationship is causal. Other variables may also influence these relationships, such as physical disability or SES, although we did account for the latter here. Future research should continue to investigate the underlying causes of this weight-related education disparity. In particular, perhaps parents, teachers, and counselors are less likely to encourage heavier students to pursue college education. Institutionalized weight-based discrimination may also be present during the undergraduate college admissions process, which is similar to such discrimination documented in the graduate admission process (Burmeister, Kiefner, Carels, & Musher-Eizenman, 2013). Both these avenues may be prime targets for weight stigma awareness and reduction initiatives.

² This effect was maintained when accounting for SES.

Table 3
Comparison of Sample 1 BMI for Students Based on Primary Funding Source

Group	<i>n</i>	Average BMI	<i>SD</i>	<i>F</i>	<i>df</i>	<i>p</i>	Cohen's <i>d</i>	95% CI
Overall				11.20	1, 249	.001	.43	[-2.38, -.62]
Parent-funded	144	21.95	3.22					
Self-funded	107	23.45 ^a	3.85					
Male				4.02	1, 118	.047	.39	[-2.20, -.01]
Parent-funded	79	22.35	2.88					
Self-funded	41	23.45 ^a	2.84					
Female				7.98	1, 129	.005	.49	[-3.35, -.59]
Parent-funded	65	21.48	3.55					
Self-funded	66	23.45 ^a	4.39					

Note. BMI = Body Mass Index; CI = confidence interval.

^a These values are identical and not a typo.

These findings should be interpreted while considering a few limitations. First, we recruited our college samples from two highly ranked, public undergraduate institutions. Therefore, while we expect these results to generalize to similar university settings, we cannot speak to the BMI distributions of other types of institutions. It may be the case that heavier students end up going to less prestigious schools. If the BMI distributions in lower-ranked institutions more closely resembled the general population, this would further indicate that weight stigma may undermine the educational aspirations and attainment of heavier individuals.

Second, while our Study 1 sample was racially/ethnically diverse and included White, Latino/a, and Asian students, it had very few Black students. Study 2 used a less diverse sample, with few Black and Latino/a students. In both studies, the race/ethnicity distribution closely matched the overall demographic makeup of the respective university, but we cannot generalize these findings broadly across ethnicities. Diversity remains an important gap to be addressed in future research, especially considering that rates of overweight and obesity tend to be highest among Black individuals (Ogden, Carroll, Kit, & Flegal, 2014).

Third, our samples provided self-reported BMI data, whereas the NHANES measured BMI directly. However, it is unlikely that

underreporting entirely explains the large effects observed here. For instance, an average-height woman would have had to underreport her weight by nearly 30 pounds. We also note that some of the NHANES data were a decade old. Growth in obesity prevalence, though, appears to have leveled off in the intervening time (Flegal, Kruszon-Moran, Carroll, Fryar, & Ogden, 2016; Ogden et al., 2014), which supports the validity of our comparison group. To capture SES, we used the number of rooms in the student's home. While this may not be the most sensitive measure, we chose it because our sample comprised adolescents, who are more likely to know the number of rooms in their home than other SES measures such as the exact values of their parents' income (Wagner et al., 2008). The drawback of this measure is that it did not allow us to compare SES in our student samples to the NHANES sample. However, our student samples came from economically diverse public universities (The New York Times, 2017a, 2017b), which are more reflective of the general population than private universities.

The findings comparing genders were not consistent between Study 1 and Study 2. Namely, in Study 1, self-funded students of both genders had higher BMIs than parent-funded students. In Study 2, this was the case only for female students. The latter

Table 4
Comparison of Sample 2 BMI to Nationally Representative Sample

Group	<i>n</i>	Average BMI	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i> value	Cohen's <i>d</i>	95% CI
Overall				-17.29	258	<.001	1.08	[-4.10, -3.26]
College sample	259	22.85	3.42					
NHANES comparison		26.53						
Male				-13.12	134	<.001	1.13	[-4.01, -2.96]
College sample	78	23.75	3.25					
NHANES comparison		26.36						
Female				-7.08	77	<.001	.80	[-3.34, -1.87]
College sample	181	22.46	3.43					
NHANES comparison		26.69						
White				-17.02	203	<.001	1.19	[-4.13, -3.28]
College sample	204	22.89	3.11					
NHANES comparison		26.60						
Asian ^a				-3.61	29	.001	.66	[-4.05, -1.12]
College sample	30	22.56	3.92					
NHANES comparison		25.15						

Note. BMI = Body Mass Index; NHANES = National Health and Nutrition Examination Survey; CI = confidence interval.

^a In the NHANES sample, Asian individuals were combined with individuals indicating "other." Latino/a individuals were only those of Mexican descent. As less than 5 and 3% of the sample reported ethnicity as Latino/a and Black, respectively, these tests were not run for these groups because of low power.

Table 5

Comparison of Sample 2 BMI Distribution to Nationally Representative Sample of 18- to 19-Year-Olds

Group	n	BMI distribution (percentage)				χ^2	df	p value	Cramer's v
		Underweight	Normal weight	Overweight	Obese				
Overall						231.13	3	<.001	.55
College sample	259	4.25	74.52	16.99	4.25				
NHANES comparison		13.35	31.41	27.62	27.62				
Male						58.30	3	<.001	.50
College sample	78	3.85	65.38	26.92	3.85				
NHANES comparison		13.73	28.48	31.53	26.26				
Female						160.87	3	<.001	.54
College sample	181	4.42	78.45	12.71	4.42				
NHANES comparison		12.99	34.21	23.87	28.94				
White						183.55	3	<.001	.55
College sample	204	3.43	75.49	17.65	3.43				
NHANES comparison		8.13	21.81	19.43	18.64				
Asian ^a						14.88	3	.002	.41
College sample	30	10.00	70.00	13.33	6.67				
NHANES comparison		16.77	36.38	26.05	20.80				

Note. BMI = Body Mass Index; NHANES = National Health and Nutrition Examination Survey; CI = confidence interval. BMI categories refer to the following to the following intervals: Underweight = BMI < 18.50; Normal weight = BMI 18.50–24.99; Overweight = BMI 25.00–29.99; Obese = BMI \geq 30.00.

^a In the NHANES sample, Asian individuals were combined with individuals indicating "other." As less than 5 and 3% of the sample reported ethnicity as Latino/a and Black, respectively, these tests were not run for these groups because of sparse cells.

finding is in line with a large body of research showing that women are more often the target of weight stigma than men (Puhl & Heuer, 2009), suggesting the Study 1 finding may be the anomaly. It is also possible that certain key differences between the universities of these two studies may underlie this difference, such as location (Study 1: California; Study 2: Minnesota). Given this, we believe that these findings would likely be reproduced among female students, but we do not have evidence that this relationship occurs broadly among male students. We recommend that future research continue to investigate this phenomenon in college males in different types of environments. Overall, we have no reason to believe that the results depend on other characteristics of the participants, materials, or context.

Nonetheless, our study design included some prominent strengths. First, we recruited more racially and ethnically diverse samples than in the original Crandall (1995) article. We also used a comparison sample of only 18- to 19-year-olds (i.e., the same age-group as our college sample), whereas the original study used a nationally representative sample of a larger age-range of the

United States population. Considering that rates of overweight and obesity are higher in adults than in adolescents (Ogden et al., 2014), this was a more stringent test of the phenomenon that college students are thinner than the general public, as here, the age-BMI discrepancy was not a potential confound. Finally, we conducted our study in two university samples, which allowed us to assess the generalizability of these phenomena in different college environments.

Overall, the current research filled an important gap in the literature by updating highly cited but outdated findings while simultaneously improving upon the prior methodology. These results suggest weight stigma is continually pervasive and potentially substantiates inequality in education. While we document a continuing tendency for college students to be thinner than the general population, regardless of gender or race/ethnicity, we also demonstrate that weight stigma may affect the higher education experience of heavy students—females in particular. In this vein, if heavier students are more likely to have to work their way through college, they will be at a disadvantage compared with their

Table 6

Comparison of Sample 2 BMI for Students Based on Primary Funding Source

Group	n	Average BMI	SD	F	df	p	Cohen's d	95% CI
Overall				5.17	1, 227	.024	.30	[−2.02, −.14]
Parent-funded	153	22.44	2.79					
Self-funded	76	23.53	4.35					
Male				.52	1, 67	.473	.18	[−2.35, 1.10]
Parent-funded	47	23.50	2.92					
Self-funded	22	24.12	4.13					
Female				5.44	1, 158	.021	.36	[−2.41, −.20]
Parent-funded	106	21.98	2.61					
Self-funded	54	23.28	4.46					

Note. BMI = Body Mass Index; CI = confidence interval.

thinner counterparts in terms of the time they can dedicate to studying, engaging in school activities, and internships and other educational opportunities. These differences are not trivial. Less study time translates to worse grades; engaging in fewer activities or devoting less time to them reduces accumulation of leadership experiences that potential employers often value; and less internship experience reduces the opportunity for networking and the potential for the internship to lead to paid positions (Briggeman & Norwood, 2011; Knouse, Tanner, & Harris, 1999). Moreover, those students relying on financial aid and student loans face the long-term burden of debt. As such, weight stigma's potential perpetuation of educational inequality may precipitate lifelong consequences for quality of life, socioeconomic disparities, and health. These could contribute to or exacerbate the many known negative physical and psychological health consequences of experiencing weight stigma (Puhl & Suh, 2015). Finally, considering the high percentage of the U.S. population with higher BMIs, the magnitude of this problem is considerable, and these disparities may therefore affect the education and achievement of a large number of young adults.

References

- Andreyeva, T., Puhl, R. M., & Brownell, K. D. (2008). Changes in perceived weight discrimination among Americans, 1995–1996 through 2004–2006. *Obesity, 16*, 1129–1134. <http://dx.doi.org/10.1038/oby.2008.35>
- Barr, A., & Turner, S. E. (2013). Expanding enrollments and contracting state budgets. *Annals of the American Academy of Political and Social Science, 650*, 168–193. <http://dx.doi.org/10.1177/0002716213500035>
- Briggeman, B. C., & Norwood, F. B. (2011). Employer assessment of the college graduate: What advisors need to know. *Journal of Natural Resources and Life Sciences Education, 40*, 19–28. <http://dx.doi.org/10.4195/jnrlse.2009.0040>
- Burmeister, J. M., Kiefner, A. E., Carels, R. A., & Musher-Eizenman, D. R. (2013). Weight bias in graduate school admissions. *Obesity, 21*, 918–920. <http://dx.doi.org/10.1002/oby.20171>
- Crandall, C. S. (1995). Do parents discriminate against their heavyweight daughters? *Personality and Social Psychology Bulletin, 21*, 724–735. <http://dx.doi.org/10.1177/0146167295217007>
- Flegal, K. M., Kruszon-Moran, D., Carroll, M. D., Fryar, C. D., & Ogden, C. L. (2016). Trends in obesity among adults in the United States, 2005 to 2014. *Journal of the American Medical Association, 315*, 2284–2291. <http://dx.doi.org/10.1001/jama.2016.6458>
- Galobardes, B., Shaw, M., Lawlor, D. A., Lynch, J. W., & Davey Smith, G. (2006). Indicators of socioeconomic position (Pt. 1). *Journal of Epidemiology and Community Health, 60*, 7–12. <http://dx.doi.org/10.1136/jech.2004.023531>
- Knouse, S. B., Tanner, J. R., & Harris, E. W. (1999). The relation of college internships, college performance, and subsequent job opportunity. *Journal of Employment Counseling, 36*, 35–43. <http://dx.doi.org/10.1002/j.2161-1920.1999.tb01007.x>
- NHANES. (2005–2012). *National Health and Nutrition Examination Survey: Questionnaires, datasets, and related documentation, 2005–2012*. Retrieved from http://www.cdc.gov/nchs/nhanes/nhanes_questionnaires.htm
- Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2014). Prevalence of childhood and adult obesity in the United States, 2011–2012. *Journal of the American Medical Association, 311*, 806–814. <http://dx.doi.org/10.1001/jama.2014.732>
- Ogden, C. L., Carroll, M. D., Lawman, H. G., Fryar, C. D., Kruszon-Moran, D., Kit, B. K., & Flegal, K. M. (2016). Trends in obesity prevalence among children and adolescents in the United States, 1988–1994 through 2013–2014. *Journal of the American Medical Association, 315*, 2292–2299. <http://dx.doi.org/10.1001/jama.2016.6361>
- Puhl, R. M., & Heuer, C. A. (2009). The stigma of obesity: A review and update. *Obesity, 17*, 941–964. <http://dx.doi.org/10.1038/oby.2008.636>
- Puhl, R., & Suh, Y. (2015). Health consequences of weight stigma: Implications for obesity prevention and treatment. *Current Obesity Reports, 4*, 182–190. <http://dx.doi.org/10.1007/s13679-015-0153-z>
- The New York Times. (2017a). *Economic diversity and student outcomes at the University of California, Los Angeles*. New York, NY: The New York Times.
- The New York Times. (2017b). *Economic diversity and student outcomes at the University of Minnesota*. New York, NY: The New York Times.
- Vyas, S., & Kumaranayake, L. (2006). Constructing socio-economic status indices: How to use principal components analysis. *Health Policy and Planning, 21*, 459–468. <http://dx.doi.org/10.1093/heapol/czl029>
- Wagner, K. D., Ritt-Olson, A., Soto, D. W., & Unger, J. B. (2008). Variation in family structure among urban adolescents and its effects on drug use. *Substance Use & Misuse, 43*, 936–951. <http://dx.doi.org/10.1080/10826080701801550>
- Wengreen, H. J., & Moncur, C. (2009). Change in diet, physical activity, and body weight among young-adults during the transition from high school to college. *Nutrition Journal, 8*, 32. <http://dx.doi.org/10.1186/1475-2891-8-32>

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