



## Weight stigma and eating behaviors on a college campus: Are students immune to stigma's effects?

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### ABSTRACT

College populations are groups of emerging adults undergoing significant transitions in eating and diet, being exposed to new social influences; many experience weight gain. Theoretically, college campuses should be places where weight stigma is evident and matters for dietary decision-making. We present the findings from two studies conducted within the same college population at a large public university, including anthropometric measures of body mass. Study 1 included two different measures of weight stigma (implicit and explicit) and measures of weight-control eating behaviors and fruit and vegetable consumption in a randomized representative sample of 204 students. Study 2 included a measure of weight responsibility and multiple measures of eating (food frequency, alcohol intake, and 24-hour dietary recalls), among freshman students ( $n = 202$ ,  $n = 157$  with 24-hour dietary recalls). Study 1 showed that the three types of stigmas were prevalent. Study 2 had a high prevalence of weight stigma attitudes and demonstrated the occurrence of unhealthful eating and binge drinking behaviors. Both studies found no relationship between weight stigma/responsibility and eating behaviors regardless of weight status. Beyond considering limitations of the study design, we propose two possible reasons for college students' relative immunity to the effects of weight stigma. Those with very high levels of stigma could be suppressing stigmatizing attitudes based on what they think others think is acceptable in a liberal college setting, or the chaotic form of "normal" eating in this population hides the effects of weight stigma.

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### 1. Introduction

Even as average weights continue to rise in the U.S., anti-fat norms and weight-related stigma seem to be both spreading and strengthening (Brewis, 2014). Anthropological analysis suggests this is because of the high cultural value placed on individual effort, responsibility, and work, with a slim body seen as reflecting that success (Brewis, 2011). This set of beliefs breeds weight-related stigma, producing strong moral associations between being "fat" and being lazy, unmotivated, and greedy (Puhl and Brownell, 2001). Experiencing this stigma does not seem to encourage successful weight loss. Rather, a range of studies show that feeling stigmatized (i.e., feeling judged, mistreated, or excluded) because of body weight tends to exert negative effects on successful weight loss behaviors, discouraging exercise, and encouraging disordered eating (Vartanian and Smyth, 2013; Wott and Carels, 2010). For example, exposure to weight-stigmatizing messages can trigger higher

calorie consumption, especially in those who believe they are overweight (Salvy et al., 2011; Schvey et al., 2011). Those who report on surveys that they feel stigmatized because of their weight (such as through teasing) also report more comfort-eating and bingeing behaviors (Haines et al., 2006) which are associated with greater risk of weight gain over time. There seems to be good theoretical rationale that weight-related stigma, because it discourages healthy diet and exercise behaviors, may be a largely-unrecognized driver of population-level overweight and obesity (Brewis, 2014).

Given the extent of weight stigmatizing attitudes in modern day society, it is plausible that these beliefs may subsequently impact health behaviors and weight outcomes. For example, among those who have experienced weight stigma, internalizing weight stigma attitudes has been shown to be related to higher exercise avoidance and lower levels of moderate-to-vigorous physical activity (Vartanian and Novak, 2011). Furthermore, anti-fat attitudes are related to higher attribution of obesity to individualized behaviors and willpower (i.e., individual factors are to blame for one's weight) (Hilbert et al., 2008; Sikorski et al., 2011). In line with this extreme anti-fat view, there seems to be a trend between one's own weight and harboring anti-fat attitudes; thin people tend to

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report higher levels of negative weight stigma attitudes compared to people who are overweight or obese (Schwartz et al., 2006). Given the complicated relationship between what people say and what they actually do, it is important to understand empirically how weight stigma attitudes impact eating behaviors.

College campuses seem, at first impression, to be places where the connection between weight stigma and disordered eating should be especially apparent. The myth of the “Freshman 15” notwithstanding, the undergraduate college years are associated with significant average weight gain and growing prevalence of overweight and obesity. Poor eating behaviors are posed as a contributing factor (Groppe et al., 2009; Racette et al., 2005), and the effects seem to carry over into adulthood (Duffey et al., 2010; Welsh et al., 2011). Newly independent students can have relatively chaotic and comparatively unhealthy eating patterns: they skip meals (Silliman et al., 2004), eat excessive amounts of high fat foods/fast food (Silliman et al., 2004; Gerend, 2009), and do not consume the recommended amounts of fruits and vegetables (Silliman et al., 2004; Huang et al., 2003). Eating disorder symptomatology – both at sub-clinical and clinical levels – is also highly prevalent among college students (Delinsky and Wilson, 2008; Malinauskas et al., 2006). Further, female college students in particular tend to have high levels of body dissatisfaction (MacNeill and Best, 2015); high levels of “dieting” and disordered patterns of eating in this group have been explained by body image concerns (Cooley and Toray, 2001). No research, to the authors' knowledge, has specifically addressed the connections between weight stigma attitudes and experiences and eating behaviors within an emerging adult college population. Several studies have used undergraduate (especially psychology) students as participants in studies related to weight stigma, but do not include relevant eating measures (Latner et al., 2008; Latner et al., 2005; Vartanian and Shaprow, 2008).

Moreover, the analytic focus of prior studies has not considered how weight stigma attitudes and experiences and eating behaviors might relate among representative samples or meaningfully bounded subgroups of students. During this transitional phase in college, students make new friends, develop new ideas, and change beliefs as they are exposed to different people in a new environment (Arnett, 2000; Buote et al., 2007; Parker et al., 2004). Post-secondary institutions are ideal settings to reach emerging adults of diverse racial, ethnic, and socioeconomic backgrounds, with over 14.9 million emerging adults in college (Institutes of Education Sciences, 2015). Understanding how stigma attitudes and experiences affect eating behaviors among college students within universities would guide the development and delivery of large-scale interventions for young adults with potential for high impact on healthy eating and weight.

What would we expect to observe about weight stigma attitudes and experiences and eating among college populations? Based on the theorized connections between weight stigma and less healthy eating as well as documentation of a variety of factors listed above (already high levels of disordered eating, new social relationships leading to exposure to new norms, high levels of body dissatisfaction, etc.), it was hypothesized that college populations should be especially vulnerable to weight stigma attitudes, and those reporting greater weight stigma attitudes and experiences will exhibit less healthy eating behaviors.

## 2. Study population and design

To better understand how weight stigma attitudes and experiences and eating behaviors intersect in college student populations, findings are presented from two studies conducted within the same college institution. Both studies examined how college students' weight stigma attitudes and experiences (personal factors) were related to healthy and unhealthy eating behaviors (behavioral outcomes). Study 1 focused particularly on identifying the extent of weight stigma on campus. A random sample of undergraduates was recruited and multiple measures of stigma and a single measure of eating behaviors were used.

Study 2 was conducted within freshman residence halls on the same campus as study 1 and included multiple measures of eating behaviors and diet, and a single measure of stigma. In the latter case, the participants are all living, as well as often eating and socializing, in a shared environment (their residence hall). Anthropometrics were collected on participants from both studies; heights and weights were measured by trained research assistants using established protocols. All research was approved by the Arizona State University (ASU) Institutional Review Board.

ASU is the largest comprehensive public university in the United States, with a student population that matches the socio-demographics of the statewide population: 40% low-income, (Arizona State University, 2011) 40% minority (Arizona State University, 2015). Over 85,000 traditional students, including one of the largest in-residence freshman populations in the country, attend ASU. In 2013, a National College Health Assessment (NCHA) standardized survey showed that the ASU student body had a prevalence of 33.6% overweight and 13.3% obese, based on student self-reported height and weight, and that average Body Mass Index (BMI) also climbed across years of undergraduate study (25.5% of first-year undergraduate students were overweight, compared to 40.2% of fourth-year students) (unpublished NCHA data).

## 3. Materials and methods

### 3.1. Study 1 methods

In study 1, a representative sample of 225 undergraduate students was recruited in 2013. Each participant completed a structured survey and a computer-based reaction-time test, and provided anthropometric measures. Initial attempts to recruit through email proved inadequate to generate acceptable response levels or capture a representative sample of the campus population, so instead a spatialized random sampling strategy was applied. Trained research assistants walked randomly selected North-South and East-West transects across campus selecting the  $n$ th person. A random number from 5 to 10 was selected each day to represent the  $n$ th person (e.g., if the number was 6, the recruiter would walk along the specified path and count each person passing until she/he met the 6th student). Inclusion criteria were that the participant had to be currently enrolled in a university-level course, and over 18 years of age. BMI was calculated based on height measures taken by trained research assistants using a plastic stadiometer and weight measures taken using Seca electronic scales, and served as a proxy for body size. Twenty-one students who did not provide anthropometric measurements were removed, resulting in a final sample size of 204. Demographics of the sample (50.5% female, 52.9% non-white) match expectations based on the diversity of ASU's student body, and the sample proved to be 29.9% overweight (BMI  $\geq 25$ ) and 13.2% obese (BMI  $\geq 30$ ), consistent with other surveys of undergraduate populations elsewhere (Laska et al., 2011; Brunt et al., 2008). Ages ranged from 18 to 36 years (mean = 23 years).

Multiple dimensions of stigma can theoretically relate to eating behaviors. Two standard ways that stigma is measured are through standardized scales to capture explicit stigma, and reaction time tests to capture implicit (internalized) stigma: as different constructs of stigma they do not need to correlate with each other to be describing stigma meaningfully (Brewis and Wutich, 2017). Measures of *explicit stigma* theoretically capture what people say, while measures of *implicit stigma* are thought to better capture habituated subconscious beliefs; these are both distinct from the actual *experience* of being weight stigmatized. In study 1, we employed both measures of stigma as our independent variables. A standard psychometric scale was used to assess generalized levels of *explicit* weight stigma during the survey interviews. The “Attitudes to Obese People” (ATOP) scale is a 20-item survey using a 6-point Likert-type scale (from “I strongly agree” to “I strongly disagree”) that has shown good reliability in prior studies (Allison et al., 1991). Statements are both positive and negative, and include statements such as

“Most non-obese people would not want to marry anyone who is obese” and “Most obese people are not dissatisfied with themselves.” In this scale, a higher score is considered suggestive of less anti-fat attitudes (i.e., higher score = less explicit fat stigma, lower score = more explicit fat stigma). An ATOP score of 60 or less was used to create a dummy variable of higher explicit stigma (1/0), with 60 being both the middle of the scale (possible scores of 0–120) and 61 the middle of the actual data distribution.

A computer-based implicit association test (IAT) via Inquisit™ was used to measure *implicit* (internalized) weight bias (Teachman and Brownell, 2001; Teachman et al., 2003; Wang et al., 2004). For this measure, each participant was presented with lists containing opposing categories: fat and slim, and good and bad. They were asked to classify synonyms for these words as fast as they could in a timed test. The key presumption was that people with more implicit anti-fat bias find it cognitively easier (and hence faster) to pair fat with bad and thin with good than to pair fat with good and thin with bad. An IAT score of  $-0.50$  was indicative of high implicit stigma, given this was the middle of the data distribution (scores ranged from  $-1.5$  to  $+1.5$ , of a possible range of  $-2$  to  $+2$ , with lower scores representing more stigma).

Eating behaviors (the main dependent variable) was assessed in two ways. Level of common weight-control eating (“dieting”) behaviors was estimated based on the question: “How often would you normally do the following as a way to watch your weight?”. The summed frequency of responses to six items: “as a way to watch your weight,” “eat small portions,” “eat less food overall,” “avoid snacks between meals,” “skip meals,” “avoid foods high in calories, such as sugary or fattening foods,” and “refuse food when it is offered.” Participants’ consumption of fruit and vegetables was assessed by asking, for the last seven days, “How many servings of fruit and vegetables did you eat, on average, each day?”

### 3.1.1. Study 1 analyses

Descriptive analyses examined the mean ATOP and IAT scores by gender and weight status. The correlation between explicit and implicit weight stigma scores was assessed. Chi-square and *t*-tests were run to determine the probability that gender, ethnicity, weight status, and stigma were independent. Logistic regression models were run to determine if weight stigma was associated with weight avoidant eating behaviors or fruit and vegetable consumption, adjusted for gender, ethnicity, and overweight status. All analyses were conducted using R statistical software (version 3.2.3, 2015, R Core Team, 2015). Results were statistically significant at  $p < 0.05$ .

### 3.2. Study 2 methods

In study 2, data were collected as part of the larger SPARC (Social impact of Physical Activity and nutrition in College) study. Participants were freshman students residing in two residence halls ( $n = 210$ : 62.4% female; 53.3% non-white, mean age 18.8 years, ages ranged between 17.7 and 20.3 years) during the 2014–2015 school year. All participants completed a 128-item web-based survey assessing college life, eating and drinking behaviors, weight stigma, and socio-demographics. Dietary consumption was measured in several ways: a) food frequency questionnaires capturing reported intake in the last seven days (Boutelle et al., 2007); b) alcohol intake questionnaires (Wechsler et al., 2002), including an adapted version of Eating and Alcohol Use Questionnaire (Lloyd-Richardson et al., 2008); and c) the validated Automated Self-Administered 24-hour Dietary Recall (ASA24), which uses the U.S. Department of Agriculture’s Automated Multiple Pass Method (Blanton et al., 2006). Weight stigma was assessed indirectly using one question, “Who do you think is most responsible when someone is obese?” with response options “individuals” and “others.” (Albrecht et al., 1982) We selected this one attribution question because the emphasis on individual responsibility for weight maintenance is the key belief that underpins why weight is so stigmatized in

the U.S. (Brewis, 2011) Participants reporting a diagnosis with anorexia nervosa, bulimia nervosa, and binge eating disorders ( $n = 8$ ) were removed from the study.

A sub-sample of participants ( $n = 173$ ) completed up to three days’ worth of 24-hour dietary recalls (two weekdays and one weekend day), assessing caloric intake, grams of protein, carbohydrates, total fat, and sugar. Those reporting dietary intakes suggestive of possible disordered eating ( $<500$  kcal and  $>5000$  kcal) ( $n = 9$ ) and students with anorexia nervosa, bulimia nervosa, and binge eating disorders ( $n = 6$ ) or unknown eating disorder status ( $n = 1$ ) were excluded, for an analytical subsample of 157 participants.

### 3.2.1. Study 2 analyses

Chi-square and *t*-tests were run to determine if eating and alcohol consumption behaviors were independent of weight stigma, measured by a weight responsibility score. Logistic regressions, adjusted for gender, race/ethnicity, Pell grant status, residence hall, age, and highest parental education were run to determine the association of weight responsibility on food frequency, alcohol intake, and dietary recall. For the 24-hour recall dataset, weekend was included as a covariate for calories, protein, carbohydrate, total fat, and sugar intake; calories was also included as a covariate for models with total fat, sugar, and protein. All analyses were conducted using R statistical software (version 3.2.3, 2015, R Core Team, 2015). Results were statistically significant at  $p < 0.05$ .

## 4. Results

### 4.1. Analysis and findings from study 1

There were differences in weight status by gender (with a higher percentage of males measured as overweight/obese), but not ethnicity (Table 1).

Table 2 provides the average ATOP (explicit) and IAT (implicit) scores for the total sample, by gender and by weight status. It was observed that, on average, both explicit and implicit weight stigma were evident in this sample. ATOP ranged from 14 to 114; while IAT scores ranged from  $-1.36$  to 1.49. The correlation between the explicit and implicit scores proved to be low, at 0.02. There was no significant difference in average ATOP or IAT scores by gender, nor in the ATOP by weight status (all  $p > 0.05$ ). For the IAT, those not overweight/obese had significantly lower (i.e., more stigmatizing) scores than those classified as overweight/obese.

### 4.2. Analysis and findings from study 2

No significant results were found ( $p < 0.05$ ) (Table 4a). On average, 44% of students reported eating breakfast regularly; fewer than 50% of students consumed four fruits and vegetables per day. Convenience and prepared foods were reported more often than home cooked meals. Binge drinking in the past two weeks was reported by 38% of the population.

**Table 1**  
Differences in stigma by weight status among study 1 participants ( $n = 204$ ).

	Not overweight (BMI < 25) n = 143	Overweight/obese (BMI ≥ 25) n = 61	p-Value (X <sup>2</sup> )
Gender n (%)			0.001
Male	60 (42%)	41 (67%)	
Female	83 (58%)	20 (33%)	
Ethnicity n (%)			0.604
Non-white	71 (52%)	35 (57%)	
White	65 (48%)	26 (42%)	



**Table 2**  
Average ATOP and IAT scores by gender and weight status among study 1 participants (n = 204).

	Average ATOP score	Average IAT score
Male	60.84 ± 14.62	−0.41 ± 0.50
Female	64.78 ± 16.43	−0.45 ± 0.46
Not overweight	62.88 ± 15.32	−0.48 ± 0.47
Overweight/obese	62.76 ± 16.56	−0.32 ± 0.49

Neither type of weight stigma was significantly associated with weight-control eating behaviors or fruit and vegetable consumption (p < 0.05) (Table 3).

**5. Discussion**

Findings from two different studies comprised of undergraduates attending the same institution suggest no generally observable relationship between higher individual-level measures of stigma and eating behaviors. This is a very surprising finding, given that college campuses are reported both as places where weight-related stigma (Vartanian and Shaprow, 2008; Webb et al., 2016) and unhealthy or chaotic eating patterns (Silliman et al., 2004; Gerend, 2009; Huang et al., 2003) are both common, even normative.

Stepping off from this possibility, and in the interests of general theory-building, the intent for the remainder of the discussion section asks: *could college students really be different from other previously studied groups?* These suggestions are highly preliminary and designed to fuel discussion rather than provide definitive answers. In devising and evaluating these Suggestions 2 and 3 we have, however, drawn extensively on the findings of continuous ethnographic data collection around the topics of weight and obesity that our larger research team has conducted with students at the same institution over the last five years (Trainer et al., 2015; Williams et al., 2015).

**Suggestion 1.** *No, they aren't different: we are measuring improperly.*

The first and obvious explanation is that the measures or sample size used were inadequate to capture the relevant relationship. In regard to measures, in study 1 there were very detailed, triangulated measures of stigma (explicit, implicit, and experienced) but weaker measures of diet. In study 2, there were very detailed, triangulated measures of diet and eating behaviors, but weaker measures of stigma. Better measures and larger samples will be needed to properly untangle the unexpected observations made here. However, the convergence of findings from two studies using two different sets of measures, and that these triangulate with what we understand ethnographically, suggests the possibility that we are correctly observing the relevant phenomena, and it is worth considering other propositions.

**Suggestion 2.** *Students are purposefully, and effectively, suppressing their weight-related stigma.*

The justification-suppression model (JSM) of prejudice suggests there can be deep and important conflicts or contradictions between

**Table 3**  
Multivariate logistic regression results examining the association between weight-related stigmas and weight avoidant eating behaviors and fruit/vegetable consumption among study 1 participants (n = 204).

	OR	95% CI	p-Value
Response: High weight-avoidant eating behaviors			
High explicit stigma	1.37	(0.69, 2.75)	0.365
High implicit stigma	1.28	(0.65, 2.56)	0.483
Experienced stigma	1.00	(0.98, 1.02)	0.822
Response: High fruit and vegetable intake			
High explicit stigma	0.70	(0.38, 1.28)	0.255
High implicit stigma	0.64	(0.36, 1.21)	0.184
Experienced stigma	0.99	(0.97, 1.01)	0.436

Model adjusted for gender, ethnicity, and weight status.

**Table 4a**  
Differences in eating and drinking behaviors by view on weight responsibility among study 2 participants (n = 202; n = 157 with dietary recall<sup>a</sup>).

	Weight responsibility		p-Value
	Individual (n = 161)	Other (n = 41)	
<b>Survey data</b>			
Breakfast eating (>4 days/week)	71 (44%)	17 (41%)	0.899
Fast food consumption (>2 days/week)	56 (35%)	19 (46%)	0.235
Convenience food consumption (>2 days/week)	64 (40%)	20 (49%)	0.384
Home cooked food consumption (>2 days/week)	53 (33%)	19 (46%)	0.156
Prepared food consumption (>4 days/week)	91 (57%)	20 (49%)	0.475
Fruit consumption (>2 servings/day)	67 (42%)	19 (46%)	0.712
Vegetable consumption (>2 servings/day)	79 (49%)	26 (63%)	0.143
Alcohol binge drinking (% yes)	61 (38%)	16 (39%)	1.000
<b>24-hour recall data<sup>a</sup></b>			
Calories <sup>a</sup> (>1500 kcal/day)	49 (40%)	18 (53%)	0.241
Protein <sup>a</sup> (>70 g/day)	57 (46%)	17 (50%)	0.854
Carbohydrates <sup>a</sup> (>200 g/day)	42 (34%)	13 (38%)	0.811
Total fat (>60 g/day)	48 (39%)	18 (53%)	0.208
Added sugar <sup>a</sup> (>80 g/day)	48 (39%)	14 (41%)	0.977

Weight responsibility was not significantly associated with any eating or alcohol consumption behaviors (p < 0.05). There were no significant results from the calorie, total fat, sugar, or 24-hour dietary recall dataset (Table 4b).

<sup>a</sup> A subsample of participants had biologically plausible 24-hour recall dietary data (n = 157).

people's desire to express a belief and the need to maintain social norms or sense of self that conflicts with that value. Much of the theorizing around justification-suppression has focused on how deeper race-related prejudices may be tempered in expression as they conflict with broader social values emphasizing tolerance or equality (Crandall and Eshleman, 2003). While this model is as yet completely untested in the domain of weight stigma, Danielsdottir, O'Brien, and Ciao have developed a theoretical rationale to suggest it may translate well (Danielsdottir et al., 2010). We would encourage future research by experts in this area to explore this.

**Table 4b**  
Logistic regression (OR, 95% CI) assessing the relationship between weight responsibility score and eating and drinking behaviors (n = 202) and dietary recall (n = 157) among study 2 participants.

	OR	95% CI	p-Value
<b>Survey data<sup>a</sup></b>			
Breakfast eating <sup>a</sup> (>4 days/week)	0.83	(0.40, 1.70)	0.616
Fast food consumption <sup>a</sup> (>2 days/week)	1.70	(0.82, 3.52)	0.153
Convenience food consumption <sup>a</sup> (>2 days/week)	1.59	(0.78, 3.27)	0.204
Home cooked food consumption <sup>a</sup> (>2 days/week)	1.93	(0.87, 4.28)	0.104
Prepared food consumption <sup>a</sup> (>4 days/week)	0.76	(0.36, 1.61)	0.468
Fruit consumption <sup>a</sup> (>2 servings/day)	1.19	(0.57, 2.49)	0.640
Vegetable consumption <sup>a</sup> (>2 servings/day)	1.84	(0.90, 3.87)	0.101
Binge drinking <sup>a</sup> (past 2 weeks)	1.01	(0.47, 2.14)	0.974
<b>24-hour dietary recall data<sup>b</sup></b>			
High calorie intake <sup>b</sup> (>1500 kcal/day)	1.61	(0.70, 3.69)	0.258
High protein intake <sup>b</sup> (>70 g/day)	0.63	(0.21, 1.87)	0.414
High carbohydrates intake <sup>b</sup> (>200 g/day)	0.57	(0.17, 1.90)	0.369
High total fat intake <sup>b</sup> (>60 g/day)	1.29	(0.43, 3.83)	0.645
High sugar intake <sup>b</sup> (>80 g/day)	0.72	(0.27, 1.85)	0.498

<sup>a</sup> Models adjusted for gender, age, race/ethnicity, Pell grant status, residence hall, and highest parental education.

<sup>b</sup> Models also adjusted for caloric intake and if a weekend day of dietary data was included.

Within the prejudice literature, it is well-established that white university students are sometimes distinctive in displaying “reverse racial discrimination,” where they evaluate and even treat other groups’ members more positively than their own (Harber, 1998; Biernat and Kobrynowicz, 1997). In the JSM, this is understood as possibly reflecting a process of pushing underlying prejudicial thoughts out of awareness. At large, diverse universities like ASU, where many students live on-campus, come into contact with a wide array of other students, meet new people often, and are exposed to liberal, tolerant values in multiple contexts (e.g., classrooms, student services, clubs and activities, policy manuals, etc.), it makes sense that even well-established and deeply held prejudicial sentiments, perhaps including those related to weight stigma, would sensibly be suppressed.

In line with the JSM, is the flexible correction model (FCM); this model is founded on the notion that members of the majority group over-corrects for their biases by providing minority group favoring responses with the underlying belief that substantial biases exist against said minority group (Aberson and Ettl, 2004; Wegener and Petty, 1995). Given the pervasiveness of anti-fat attitudes in American society, it is highly likely that college students are aware of the negative biases associated with individuals who are overweight/obese. The knowledge of these anti-fat viewpoints could lead college students who harbor feelings of bias toward those who are overweight/obese to try and negate these feelings by attempting to appear unbiased on research surveys. For example, it has been previously demonstrated by Brewis and Wutich that college students, in general, tend to present with high levels of implicit fat stigma and low levels of explicit fat stigma (Brewis and Wutich, 2012). Therefore, it is reasonable to assume, especially given the strong and recent push for political correctness on college campuses (Berman, 2011), for college students to feel a very real pressure to overcompensate for their implicit weight stigma biases.

Three observations drawn from this analysis are relevant to assessing this suggestion. On the one hand, it was observed that while students are on average exhibiting weight-related stigma in both explicit and implicit tests, the levels of stigma are on the low side of those previously derived from other samples (Brewis, 2011). On the other hand, implicit attitudes such as those measured in an IAT are considered the closest (if still flawed) measure of prejudicial beliefs (Greenwald et al., 1998), and where the JSM holds it is expected they should not well correlate to intra-individual measures of explicit stigma. This is seen in the study 1 analysis: for individuals, the scores on the ATOP (explicit stigma) and those of the IAT (implicit stigma) have a low correlation (0.02).

**Suggestion 3.** *Eating behaviors in college are normatively poor, so that the effect of stigma on eating becomes less obvious.*

Our third suggestion proposes that the lack of correlation between weight stigma and unhealthy eating behavior may be because eating behaviors are already unhealthy across all groups of students. Thus, the relative effects of weight stigma in shaping less healthy eating behaviors are hidden amidst the noise of generally poor eating choice (i.e., “the damage is already done”). Although the foundations for eating behaviors are built during childhood (Birch and Fisher, 1998), eating habits continue to evolve throughout adolescence. Adolescence is a time of increased nutritional needs (Gidding et al., 2006); however, adolescents tend to maintain a diet that is of poor quality (e.g., high in junk food and tied to unhealthy weight control behaviors) (Piernas and Popkin, 2010; Lynch et al., 2008; Neumark-Sztainer et al., 2006). Youth in this life stage have heightened concerns with their body image and how they are perceived by their peers (Davison and McCabe, 2006). As adolescents transition into emerging adulthood (commonly viewed as ages 18–29) during their college years, this mentality and poor eating habits persist and can even expand, as was documented in the two studies presented here and in other research (Gerend, 2009; Kelly-Weeder, 2011). Indeed, college students are

unlike any other population, as they learn new norms, acquire new independence and upward mobility, live in new environments, and have new social networks (Arnett, 2000; Buote et al., 2007; Parker et al., 2004). Given that most college students fall into the category of emerging adults, which is characterized by nearly a decade of time where the individual forms their beliefs and value systems while trying to establish identity, it is likely that these behaviors continually ebb and flow during all four years of college, and beyond. It is likely, then, that these other factors may have a greater influence than stigma on this unique group’s eating choices.

### 5.1. Limitations

This study has additional limitations. The sample size in each respective study was not large. Findings may not be generalizable to other college campuses; however, study 1 used a random sample, while study 2 was racially and ethnically diverse. While the ATOP has been found to have strong reliability in other studies, it has yet to be tested among college students; other measures in study 1 were not tested for validity or reliability among college students. While the stigma tools used in study 1 are the gold standard (especially the IAT), they are very expensive and difficult to implement. The single summary stigma question used in study 2 provides by contrast an indirect measure of stigma only, and has not been validated. In study 2, the multiple-pass 24-hour dietary recall method was used as the gold standard of self-reported diet in NHANES and other national studies (Johnson, 2002). The pilot data among college students indicated strong test-retest reliability for the breakfast eating measure ( $r = 0.79$ ), moderate test-retest reliability for weight responsibility ( $r = 0.63$ ), fast food ( $r = 0.60$ ), prepared foods (0.67) and home cooked foods ( $r = 0.58$ ), and low test-retest reliability for convenience foods ( $r = 0.21$ ). With a cross-sectional study design, causal inferences cannot be made; however, this study sets the stage for future research.

## 6. Conclusion

As one of the first studies attempting to link weight stigma and eating behaviors on a college campus, the finding that the two have no clear relationship was unexpected. A wide array of body image research suggests college students are both highly concerned about body image (Cooley and Toray, 2001) and also exhibit high rates of generally chaotic or technically disordered eating (Delinsky and Wilson, 2008; Vohs et al., 2001). Thus, we would expect this is a population where the effects of weight stigma on eating behaviors would be especially obvious. Yet, two different approaches to capturing this pattern, one with detailed and multiple measures of stigma (and capturing significant weight-related stigma, as expected) and one with detailed and multiple measures of eating behaviors (capturing high levels of unhealthy eating, again as expected) proved a null finding. We suggest three possible explanations: a) small sample size and/or improper measurement tools, b) that the effects of weight stigma are being suppressed as students work to fit within important situational norms about the importance of tolerance and acceptance on campus, or c) that chaotic, disordered, and unhealthy eating is common for other reasons that the effects of weight-related stigma on eating still exist but are simply not observable given all the other influences undermining healthy eating choices. Given the lack of prior published studies with college populations to act as a reference point, it is difficult at this time to know if the observation of a non-relationship is more likely an artifact of improper design or if it may be capturing an important element of difference of college life in this regard. Replication studies are needed to examine the relationship between weight stigma attitudes and eating behaviors with stronger measures. More research is needed on the relationship between weight stigma attitudes and experienced weight stigma and how that is related to eating behaviors.

## Conflict of interest statement

The authors declare that there are no conflicts of interest.

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