

Predicting anti-fat attitudes: individual differences based on actual and perceived body size, weight importance, entity mindset, and ethnicity

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Abstract The purpose of the current study was to examine the relative impact of actual and perceived weight, weight importance, entity mindset, and ethnicity on anti-fat attitudes as well as to examine whether certain variables play the role of mediator. Participants included a multi-ethnic U.S. sample of 923 female undergraduates who completed a series of measures online. Lower BMI, higher perceived weight, higher importance of weight, endorsement of an entity mindset, and identification as White as compared to Black, Hispanic, or Asian predicted higher overall anti-fat attitudes. Examination of the individual Antifat Attitudes Questionnaire subscales (i.e. dislike, fear of fat, and willpower) using Relative Weight Analysis suggested that weight importance is an important predictor of multiple aspects of anti-fat attitudes. In addition, weight importance mediated the relationship between perceived weight and fear of fat as well as the relationship between ethnicity and dislike. Implications of findings and future research directions are discussed.

Keywords Anti-fat attitudes · Ethnicity · Body size · Weight importance · Perceived weight

Weight-based discrimination is common in the United States and has been documented in a variety of settings, including the workplace, healthcare, education, and in interpersonal relationships [1]. The prevalence of such discrimination appears to be increasing, with one study reporting a rise of approximately 65 % in perceived weight discriminations among U.S. adults from 1995–1996 to 2004–2006 [2]. Overweight community members reported

an average of 11.12 episodes of weight stigma in a 2-week period [3]. This escalating trend is alarming given that perceived weight discrimination is associated with poorer physical health and emotional well-being among overweight and obese individuals [4, 5]. Thus, it is becoming even more important to investigate individual differences in weight-based prejudice as this has the potential to guide the development of interventions to reduce obesity stigma and discrimination. The purpose of the current study was to examine individual differences in anti-fat attitudes based on actual and perceived weight, weight importance, entity mindset, and ethnicity.

Negative attitudes toward the obese have been referred to as anti-fat attitudes [6], and many studies have established the prevalence of implicit [7] and explicit anti-fat attitudes [8–11]. Studies have been mixed in the establishment of a strong correspondence between explicit and implicit measures [7, 8, 12]. Participants who scored high on Crandall's Dislike of Fat subscale also responded faster to negative words and slower to positive words after priming with the image of an obese woman. Scores on explicit measures of anti-fat attitudes have been associated with obesity discrimination in that participants who score higher on an explicit anti-fat attitude measure assign lower starting salaries, decreased leadership potential and decreased overall employability ratings for candidates who are overweight as compared to normal weight [13]. Therefore, explicit measures of anti-fat attitudes have been demonstrated to be associated with behavioral outcomes.

Although much research has examined the nature of anti-fat attitudes, less is known about individual differences in anti-fat attitudes [14]. Past research has examined how actual and perceived weight, weight importance, entity/incremental mindsets, and ethnicity may influence anti-fat

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attitudes. We briefly review the literature and note how the current study builds on this past research.

Evidence regarding the extent to which one's own body weight influences his or her anti-fat attitudes has been mixed. Some studies find that overweight and obese individuals appear to endorse anti-fat attitudes at rates similar to normal-weight individuals, such that all weight groups demonstrate anti-fat bias (e.g., [6, 15]). However, others noted that this past research was limited in that participants with a wide-range of body weights were not represented [16]. Including a wide range of body types, Schwartz et al. (2006) found that although anti-fat attitudes were evident in all weight groups, this bias was especially strong for thinner individuals with less anti-fat bias among heavier individuals.

Research has suggested that perceived weight may function differently from actual weight [17]. Some findings suggest that decreased health-related quality of life, decreased general life satisfaction, and increased depression in adolescents relate more strongly to perceived weight than actual weight [18, 19]. Given that perceived weight may differ from actual weight, it might be equally important to examine anti-fat attitudes as a function of body image, particularly perceived weight. When examining both actual and perceived weight simultaneously, only perceived weight was a significant predictor of children's ratings of an overweight figure; those who viewed themselves as heavier expressed less anti-fat attitudes [14].

Research within the body image literature has consistently shown weight importance, defined as the self-reported emphasis or importance one places on weight and body shape in determining self-views, to be a strong predictor of disordered eating and persistent dieting [20]. Moreover, weight importance predicts the continuity of these behaviors between adolescence and adulthood. For those that identify as placing a high value on their appearance in determining how they feel about themselves, anti-fat attitudes may be more prominent as they may devalue others who violate socially prescribed thin ideal norms. Being high on appearance orientation is associated with greater anti-fat attitudes; this may be because those who view their own appearance as very important believe others should also value appearance and strive to look their best or may be due to an increased number of personal appearance comparisons [21, 22]. Similarly, dysfunctional appearance beliefs, or the extent to which one feels their appearance determines their worth, have been associated with stronger anti-fat attitudes [23].

In addition to weight-related beliefs, Dweck and colleagues argue that perceptions of the malleability of traits along a continuum predict how an individual processes information about the self as well as others and even groups [24]. Those who score high in entity mindset

endorsement would thus be characterized as low on incremental mindset endorsement. Those with an incremental mindset believe behavior varies as a function of time and the situation, whereas entity mindset is typically associated with the belief that there is a great amount of consistency in behavior. Those who report entity mindsets are more likely than those who report incremental mindsets to endorse stereotypes, perhaps because entity theorists believe they can adequately judge someone based on limited information [24, 25]. Those who endorse incremental mindsets are less likely to endorse stereotypes as they view behavior as being more context-dependent. In addition, those who endorse entity mindsets are less likely than incremental theorists to confront bias perhaps due to the belief that people cannot change [26]. In an examination of weight-based discrimination, an entity mindset as compared to an incremental mindset was associated with viewing an obese job candidate as less qualified and being less likely to suggest hiring this candidate [27]. Likewise, an entity mindset was also associated with viewing an obese job candidate as less sincere and less competent, suggesting that those with entity mindsets view weight as fixed, which may lead them to see the obese as "innately less competent" [27, p. 20]. However, other research has demonstrated that provision of materials emphasizing the entity mindset of obesity (i.e., obesity is less controllable due to genes, environmental and sociocultural factors) leads to less implicit anti-fat prejudice [28]. Therefore, research examining entity/incremental mindsets and weight stereotyping has produced mixed results [28].

Anti-fat attitudes have also been examined as a function of ethnicity. Black women have been found to express less anti-fat attitudes than White women [29]. Because Black women are more likely to be overweight than White women, they may disengage from the thin ideal, which in turn, serves a self-protective function. Hispanic women may respond in a similar manner to Black women and demonstrate lower anti-fat attitudes, whereas Asian women may respond in a similar manner to White women and endorse high levels of anti-fat attitudes [29]. Consistent with this suggestion, White women have been found to have higher anti-fat attitudes than Hispanic women [30]. Asian American females have reported high levels of weight concerns despite being less likely to be obese leading some to suggest that thinness may be especially valued by the Asian culture [31]. Nevertheless, it is important to consider that rates of overweight and obesity have been increasing in Asia with wide variability among different geographic regions which may impact weight stigma [32]. This increase along with a global trend towards increased weight stigma even in cultures previously characterized as "fat positive" (e.g. Mexico and American Samoa) suggests it is important to continue to

examine ethnicity as fluctuations in obesity rates and global acceptance of weight stigma occur [33].

In aggregate these studies suggest the importance of examining individual differences in anti-fat attitudes as a function of actual and perceived weight, weight importance, entity/incremental mindset, and ethnicity. Though past research has greatly improved our understanding of individual differences in anti-fat attitudes, this work has been limited in a number of ways. Individual difference variables have often been examined in isolation, and important information can be gained by examining multiple factors in the same analyses. In addition, several studies relied on samples of limited diversity, both in terms of ethnicity and weight, leading the authors to highlight the need for replication in more diverse samples [14, 23]. The current study sought to examine the relative impact of each of these variables on anti-fat attitudes as well as to examine whether certain variables play the role of mediator. It was hypothesized that lower BMI, lower perceived weight, higher importance of weight, endorsement of an entity mindset, and identification as White would predict higher anti-fat attitudes. As done in previous research [34, 35], the subscales of the Antifat Attitudes Questionnaire were also examined separately to determine if unique patterns emerged for Dislike, Fear of Fat, and Willpower subscales. As part of an exploratory analysis, it was further hypothesized that weight importance would show the highest relative importance in predicting Fear of Fat and Dislike based on previous research [21, 22]. Given that an association between ethnicity and weight stigma has been established [36], we sought to explore whether weight importance mediated this relationship. In addition, given that physical appearance concerns and fear of fat have been associated in past research [37] as well as disordered eating and weight importance [20], we further sought to determine whether weight importance partially mediated the relationship between perceived weight and fear of fat. In addition, it was hypothesized that weight importance would mediate the relationship between perceived weight and Fear of Fat as well as between ethnicity and Dislike.

Methods

Participants

923 female participants were enrolled in a 4-year university, which primarily serves women, and received course credit for their participation. Participants reported their ethnicity as follows: 10.7 % Asian, 29.4 % Black, 29.6 % White, and 30.3 % Hispanic. Participants ranged in age from 18 to 57 with a mean age of 19.83 ($SD = 4.2$). Participants had a mean BMI of 25.57 ($SD = 6.58$). BMI

classifications were as follows: 5.7 % Underweight, 54.9 % Normal Weight, 20.4 % Overweight, and 18.9 % Obese. Therefore, the distribution of BMI classifications in the current study is similar to that reported as part of the Behavioral Risk Factor Surveillance System [BRFSS; 38]. Of the 18,359 respondents in the BRFSS study, BMI classifications were as follows: 4.3 % Underweight, 56.0 % Normal Weight, 26.1 % Overweight, and 13.6 % Obese.

Materials and procedure

At a place and time of their choosing, participants completed surveys online in the following order.

Implicit Person Theory Scale (IPT)

The IPT assesses entity and fixed mindset beliefs about people across personality and ability domains [39]. The scale is comprised of eight 6-point Likert scale items. Lower scores indicate stronger entity beliefs and higher scores indicate stronger incremental beliefs. The IPT has been found to have strong test–retest reliability and high internal consistency [39, 40]. The current study found high internal consistency ($\alpha = 0.85$).

Anti-fat attitudes questionnaire (AFA)

The 13-item AFA assesses explicit anti-fat attitudes on a 10-point Likert scale with higher scores indicating higher anti-fat attitudes [6]. The current study also found high internal consistency for the AFA ($\alpha = 0.85$). The AFA is composed of three subscales. The Dislike subscale is seven items and measures one's dislike of overweight people. The fear of fat subscale is 3 items and assesses how concerned one is at becoming overweight. The willpower subscale is 3 items and measures the perception of controllability of being overweight with higher scores indicating belief in the controllability of weight. The internal consistency for each of the AFA subscales was high for the dislike, fear of fat, and willpower ($\alpha = 0.82$, $\alpha = 0.88$, and $\alpha = 0.81$, respectively).

Project EAT questions

Project EAT is a longitudinal study of adolescent weight and health behaviors [41]. Based on previous research which has used these items successfully, select questions from the Project EAT study were utilized to assess perceived weight and weight importance. Perceived weight was assessed with a 5-point Likert scale question in which participants rated their current weight as ranging from

Table 1 Correlations between predictor variables and Anti-fat Attitudes Subscales

	BMI	Perceived weight	Weight importance	Incremental mindset	AFA dislike	AFA fear	AFA willpower	AFA total
BMI	–							
Perceived weight	0.65**	–						
Weight importance	0.14**	0.24**	–					
Incremental mindset	0.04	–0.01	0.03	–				
AFA dislike	–0.09**	–0.03	0.12**	–0.11**	–			
AFA fear	0.01	0.22**	0.47**	–0.04	0.32**	–		
AFA willpower	–0.09**	0.01	0.26**	–0.08*	0.40**	0.48**	–	
AFA total	–0.07*	0.09**	0.37**	–0.10**	0.76**	0.78**	0.77**	–

* $p < 0.05$
 ** $p < 0.01$

‘very underweight’ to ‘very overweight’. Weight importance was assessed with a 4-point Likert scale question that asked “During the past 6 months, how important has your weight or shape been in how you feel about yourself?” A higher number reflected more importance of weight or shape to how one feels about oneself.

Demographics

Participants indicated their ethnicity, weight in pounds, height in inches, and age on the demographic questionnaire. BMI was calculated using self-reported height and weight.

Results

Correlations among variables are presented in Table 1. Although many significant relations emerged, it is important to note that some of the effect sizes were quite small. Further, correlations between the AFA subscales ranged from $r(921) = 0.32$ to $r(921) = 0.48$ suggesting the importance of examining the predictors in relation to each subscale as well as total AFA score. For each AFA subscale as well as AFA total score, we conducted a regression analysis with the following predictors: BMI, ethnicity, perceived weight, weight importance, and mindset. Ethnicity was dummy coded with the reference group of White creating three variables: Hispanic, Asian, and Black. As part of an exploratory analysis to supplement these traditional multiple regression analyses, we conducted a relative weight analysis (RWA) using RWA-Web [42] as well as exploratory mediational analyses. RWA is becoming increasingly common as it allows researchers “to decompose the total variance predicted in a regression model (R^2) into weights that accurately reflect the proportional contribution of the various predictor variables” [42, p. 2]. We report raw relative importance weights (RW) for the variables in each analysis.

AFA total

The unstandardized and standardized regression coefficients and R^2 values for the model predicting the AFA total score are reported in Table 2. Participants who reported lower BMI scores showed higher levels of anti-fat attitudes. In addition, anti-fat attitudes were higher in White participants compared to Asian, Black, and Hispanic participants. Participants who had higher perceived weight and participants who emphasized the importance of weight reported higher anti-fat attitudes. Finally, participants who endorsed an incremental rather than entity mindset were less likely to display anti-fat attitudes. An examination of the relative weights suggest that weight importance ($RW = 0.1308$) was the most important predictor of AFA total.

AFA dislike

Higher BMI and greater endorsement of incremental mindset were predictors of lower AFA Dislike scores

Table 2 Unstandardized and standardized regression coefficients for model predicting total AFA score

Predictors	R^2	B	SE	β	t -value	RW
	0.21**					
BMI		–0.04	0.01	–0.18	–4.51**	0.0141
Black		–0.52	0.12	–0.15	–4.24**	0.0160
Asian		–0.37	0.16	–0.08	–2.29*	0.0009
Hispanic		–0.74	0.12	–0.22	–6.26**	0.0269
Perceived weight		0.26	0.08	0.13	3.29**	0.0118
Weight importance		0.64	0.06	0.36	11.56**	0.1308
Incremental mindset		–0.15	0.05	–0.09	–2.90**	0.0080

* $p < 0.05$
 ** $p < 0.01$

Table 3 Unstandardized and standardized regression coefficients for model predicting AFA dislike

Predictors	R^2	B	SE	β	t -value	RW
	0.06**					
BMI		-0.02	0.01	-0.09	-2.13*	0.0068
Black		-0.29	0.12	-0.10	-2.56*	0.0037
Asian		-0.19	0.15	-0.05	-1.25	0.0005
Hispanic		-0.56	0.11	-0.20	-5.01**	0.0204
Perceived weight		0.02	0.07	0.01	0.25	0.0013
Weight importance		0.20	0.05	0.13	3.80**	0.0172
Incremental mindset		-0.14	0.05	-0.09	-2.78**	0.0104

* $p < 0.05$
 ** $p < 0.01$

(see Table 3 for unstandardized and standardized regression coefficients and R^2 values). Conversely, placing greater importance on weight predicted higher Dislike. Further, Dislike scores were higher in White participants compared to Black and Hispanic participants. An examination of the relative weights suggests that weight importance (RW = 0.0172) and being Hispanic (RW = 0.0204) were the most important predictors of AFA dislike.

AFA fear

Participants who reported higher BMI scores reported lower fear of fat (see Table 4 for unstandardized and standardized regression coefficients and R^2 values). However, those who reported higher levels of perceived weight and ascribed greater importance to weight showed higher levels of fear. White participants reported higher fear of fat than Black and Hispanic participants. An examination of the relative weights suggests that weight importance (RW = 0.2016) and perceived weight (RW = 0.0402) were the most important predictors of fear.

AFA willpower

Higher BMI and endorsement of an incremental mindset predicted lower Willpower scores, whereas weight importance positively predicted willpower scores (see Table 5 for unstandardized and standardized regression coefficients and R^2 values). Willpower scores were higher in White participants compared to Asian, Black, and Hispanic participants. An examination of the relative weights suggests that weight importance (RW = 0.0715) was the most important predictor of willpower.

Table 4 Unstandardized and standardized regression coefficients for model predicting AFA fear

	R^2	B	SE	β	t -value	RW
	0.28**					
BMI		-0.09	0.02	-0.19	-4.78**	0.0110
Black		-0.82	0.23	-0.12	-3.55**	0.0152
Asian		-0.38	0.31	-0.04	-1.23	0.0005
Hispanic		-0.96	0.22	-0.15	-4.27**	0.0098
Perceived weight		0.91	0.15	0.24	6.16**	0.0402
Weight importance		1.53	0.10	0.44	14.70**	0.2016
Incremental mindset		-0.13	0.10	-0.04	-1.32	0.0015

* $p < 0.05$
 ** $p < 0.01$

Table 5 Unstandardized and standardized regression coefficients for model predicting AFA willpower

	R^2	B	SE	β	t -value	RW
	0.12**					
BMI		-0.06	0.02	-0.15	-3.47**	0.0120
Black		-0.74	0.21	-0.14	-3.57**	0.0113
Asian		-0.79	0.28	-0.10	-2.87**	0.0026
Hispanic		-0.97	0.20	-0.18	-4.79**	0.0161
Perceived weight		0.16	0.13	0.05	1.22	0.0031
Weight importance		0.77	0.09	0.27	8.28**	0.0715
Incremental mindset		-0.21	0.09	-0.08	-2.36*	0.0056

* $p < 0.05$
 ** $p < 0.01$

Exploratory mediation analyses

Following the guidelines set forth by Baron and Kenny [43], we tested the hypothesis that weight importance partially mediated the relation between perceived weight and AFA fear score by performing three regression analyses [43]. In the first model, perceived weight was a significant predictor of the outcome, AFA fear, $F(1, 921) = 48.35, p < .001$ with the b coefficient of .85 (SE = 0.12). In the second model, perceived weight was a significant predictor of the mediator, weight importance, $F(1, 921) = 58.13, p < 0.001$ with the b coefficient of .27 (SE = 0.04). In the third model, both perceived weight and weight importance significantly predicted the outcome, AFA fear, $F(2, 920) = 142.78, p < 0.001$. The b coefficient for perceived weight on AFA fear controlling for weight importance was .44 (SE = 0.11), which is lower

than the b coefficient of .85 ($SE = 0.12$) from the simplified model of perceived weight predicting AFA fear. The b coefficient for weight importance on AFA fear controlling for perceived weight was 1.55 ($SE = 0.10$). The Sobel test indicated a statistically significant mediation effect, $Z = 6.19$, $p < 0.001$.

Likewise, we examined whether weight importance mediated the relation between ethnicity and AFA dislike. Given that ethnicity was a multicategorical independent variable, we followed the procedure outlined by Hayes and Preacher (2013). In order to accommodate our multicategorical independent variable, we used the SPSS macro, Mediate [44]. Weight importance appeared to mediate the effect between Black ethnicity and AFA dislike as the confidence interval did not cross zero, ranging from -0.094 to -0.016 . Black participants had lower dislike scores than did White participants. Black participants placed less importance on weight than did White participants, and weight importance positively predicted AFA dislike. The confidence interval straddled zero when focusing on Asian and Hispanic participants indicating these relative indirect effects were not significant.

Discussion

The results supported the hypothesis that lower BMI, higher importance of weight, endorsement of an entity mindset and identification as White predicted higher total anti-fat attitudes. Contrary to hypotheses, higher perceived weight was associated with higher total anti-fat attitudes as opposed to lower perceived weight. As in other studies which included individuals with a wide range of body weight, our findings support that anti-fat attitudes are stronger in thinner individuals [14]. We discuss each predictor individually noting differences among different aspects of weight stigma as well as relationships among specific predictors.

A critical finding of the current study was the consistent relationship between the importance one places on appearance and different aspects of anti-fat attitudes. Relative weight analyses indicated that weight importance accounted for the most variance of any of the variables examined for total anti-fat attitudes, fear of fat, and belief in the controllability of weight. The importance one places on weight was the second strongest predictor for dislike of overweight people. As in previous studies, participants who reported their weight was very important to their self-worth endorsed stronger weight bias [21]. Those who value their weight may expect others to emphasize weight, believe weight is within an individual's control, and thus devalue those who are overweight or obese. In addition, those who valued weight were also those who most feared the

possibility of becoming fat. This may further indicate a heightening of sensitivity to weight information. These findings suggest that prevention and intervention programs should work to deemphasize the importance one places on weight in order to decrease weight stigma. Additionally, decreasing weight importance may reduce fear of fat, and thus lead to a reduction in unhealthy dieting behaviors and body image.

Individuals who self-report lower BMI not only showed increased dislike of overweight people, but also reported greater fear of fat and higher belief in the controllability of weight. This supports previous research using diverse samples that have shown increased weight stigma in normal and underweight populations [16]. It furthers this past research by demonstrating that actual BMI predicts multiple aspects of weight stigma. This points to the importance of examining weight stigma with large, diverse samples.

Unlike actual BMI, higher levels of perceived weight predicted greater fear of fat; further, perceived weight was not significantly related to dislike or willpower subscales. Therefore, the perception that one is heavier may sensitize one to any further weight gain whereas being physically thin leads to more weight stigmatization. Given that previous research has found that lower well-being relates more strongly to perceived weight than actual weight [17–19] and the current findings that perceived weight accounts for more variability in fear of fat than actual weight, future research on the relationships between perceived weight and adjustment should consider fear of fat as a possible mediator. In addition, this study suggests that weight importance mediates the relationship between perceived weight and fear of fat, and thus it would be important to also assess weight importance.

Consistent with previous research [29], Black and Hispanic participants had lower anti-fat attitudes than White participants in the current study and this pattern held for dislike of fat, fear of fat, and belief in the controllability of weight. Of particular note, Hispanic ethnicity predicted the greatest amount of variance in the dislike of overweight people than any other variable. Hispanic participants showed lower dislike of overweight than White participants. This suggests that there may still be ethnic differences in weight stigma even in light of global trends away from “fat-positive” cultures [33]. In our mediation analysis, we found that Blacks and Hispanics placed lower importance on weight which in turn predicted higher dislike of overweight people. However, the indirect effect was only significant for Black participants. Future research should explore the nuanced relationship between ethnicity, weight importance, and weight stigma.

Unlike previous research related to drive for thinness, but consistent with the argument that there is increasing variability in weight related issues in different geographic

regions in Asia [32], Asian participants in the current sample showed less belief in the controllability of weight in comparison with White participants. As the current Asian sample included individuals from a variety of regions such as China, India, Korea, and the Philippines, our findings may reflect that variability in weight-related issues. Future research should attempt to examine regional differences in weight prejudice within an Asian sample.

In addition, the current study suggests that endorsement of an entity mindset predicted greater dislike of fat and stronger belief that overweight is due to a lack of willpower. This is consistent with findings that an entity mindset is typically associated with the belief that behavior is consistent as well as general endorsement of stereotypes [24]. However, it is important to note that while the endorsement of an entity mindset had predictive value in the initial regression models, relative weight analyses revealed that it was not as important as other variables such as weight importance. These findings suggest that programs that include a component that promotes incremental beliefs in addition to examination of how much importance one places on weight and cultural practices may be helpful in reducing weight stigma.

In conclusion, the current study addressed several weaknesses in the literature such as the examination of variables in isolation and lack of diversity in the sample. Inclusion of the relative weight analysis and mediation analyses allowed for an examination of multiple predictors of anti-fat attitudes and suggests that many variables contribute to weight stigma. Nevertheless, the current study is not without its own limitations. One weakness of the current study is that participants self-reported weight; however, other research suggests that self-reported height and weight can be successfully used for BMI calculations [45]. Another limitation was that the predictors in the current study each accounted for a small amount of variance in anti-fat attitudes. Future research should examine how personality dimensions and social relationships may contribute to weight stigma. The results support the need to further consider the multifaceted nature of anti-fat attitudes and continue to explore the diversity of attitudes towards people of size in a variety of samples, which in turn, should inform programs to promote positive body image and decrease weight stigma.

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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