

ORIGINAL ARTICLE

Disgust and perceived control in attitudes toward obese people

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Background: Efforts to explain negative attitudes toward obese people have centered on beliefs about the controllability of body weight, whereas other processes (such as the emotion of disgust) have been largely ignored. This study examined the role of disgust in evaluations of obese people, as well as other social groups (for example smokers, drug addicts, women, homosexuals, politicians).

Method: In three studies, participants (total $N = 524$) made ratings of how much they believe that obesity is a matter of personal control, indicated how disgusted they are with obese people, and reported their attitudes toward obese people. In Study 1, participants also made similar ratings (perceptions of control over group membership, disgust, and attitudes) for 15 additional social groups.

Results: Disgust was the strongest predictor of negative attitudes toward obese people, and disgust fully mediated the association between perceptions of control and attitudes toward obese people. In addition, obese people were rated less favorably, and as more disgusting, than almost all social groups. Across all social groups, perceived control over group membership was positively correlated with disgust ratings, and disgust mediated the link between perceived control and favorability ratings.

Conclusion: These findings indicate that disgust is an important, yet understudied, component of weight bias. Furthermore, these findings situate representations of obesity in a broader context by establishing similarities with other social groups.

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Introduction

Goffman¹ described stigma as an attribute that is undesirable or devalued in a particular social context. The stigma of obesity is a particularly potent example. Bias and discrimination against overweight and obese people is widespread, affecting domains ranging from employment to romantic relationships.² Weight bias exists despite the fact that rates of overweight and obesity have increased dramatically over the past three decades,³ making larger body sizes more normative. Negative attitudes toward obese people are observed both implicitly and explicitly,^{4,5} and are even observed among obese people,⁶ children,⁷ and health care professionals.⁸

Efforts to explain these negative attitudes have centered on a feature that seems to distinguish obesity from certain other stigmas: Obesity and body weight (more generally) are seen as being under an individual's personal control. Although the scientific community acknowledges biological, behavioral, and social contributors to body weight,⁹ a common belief in society at large is that one's body weight is (almost infinitely) malleable. Consequently, individuals who are overweight are blamed for being lazy and not exercising self-control. There is considerable evidence that beliefs about the controllability of body weight predict anti-fat bias.⁴ Unfortunately, efforts to reduce negative attitudes toward overweight and obese people by modifying individuals' beliefs about the controllability of body weight have not been particularly effective.^{5,10} That is, although people's beliefs about the causes of obesity can be shifted, these shifts in beliefs do not appear to impact their attitudes toward obese people.

Another potential explanation for the strong negative attitudes toward obese individuals relates to people's emotional reactions to stigmatized groups. Researchers have noted that stigmatized groups can elicit different emotions,

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depending on the particular threat that the stigmatized group poses to one's own social group.^{11,12} For example, anger is the typical response when valuable resources (for example jobs) are taken, and fear is the typical response when physical safety is threatened. Disgust, in particular, has been implicated in strong forms of prejudice.¹³ Disgust is described as a basic emotion that is elicited when people encounter a physical or moral contaminant and motivates distancing from the object.¹⁴ Researchers have shown that disgust is implicated in judgments of homosexuals.¹¹ There is also some initial evidence suggesting that disgust might be related to perceptions of overweight and obese individuals.^{15,16} In a recent study, Krendl *et al.*¹⁷ found activation in brain regions associated with disgust (such as the amygdala) when participants viewed images of stigmatized groups (including obese individuals). They further showed that the magnitude of the activation in these regions was greatest for the most negatively evaluated images. These findings provide a firm rationale for further exploring disgust in judgments of obesity.

The purpose of this study was twofold: (1) to examine the relevance of both control beliefs and disgust in people's evaluations of obese individuals, and (2) to situate perceptions of obese individuals in a broader social-psychological context by examining how representations of obesity fit with representations of other stigmatized groups. It was predicted that obese people would generally be rated unfavorably, and that perceptions of control would be related to negative judgments of obese individuals. Furthermore, it was predicted that disgust could account for some of the variance in favorability ratings. Finally, it was predicted that obese individuals would be rated among the most disliked and most disgusting of the social groups examined.

Study 1

Method

Participants. Three hundred undergraduate students (150 men, 150 women) from a large private university in the northeastern United States completed a set of questionnaires online in exchange for credit in a psychology course. Their mean age was 19.2 years (s.d. = 1.34), and their mean body mass index (BMI) was 23.5 (s.d. = 3.80).

Materials and procedure. Participants indicated their perceptions of a variety of social groups by responding to three questions: (1) 'How favorable is your attitude toward (group)?' (1 = *Very unfavorable*, 9 = *Very favorable*); (2) 'How much do you believe that being a member of this group is under the individual's personal control?' (1 = *Not at all under personal control*, 9 = *Completely under personal control*); and (3) 'How disgusted are you with (group)?' (1 = *Not at all disgusted*, 9 = *Extremely disgusted*). For each question, participants made ratings of 16 different social groups: obese people, African Americans, homosexuals, women, elderly people, mentally ill

people, homeless people, Americans, politicians, rich people, religious people, drug addicts, smokers, welfare recipients, lottery winners, and honors students. The order of presentation of the questions and of the social groups was random.

Participants also completed the following measures: (1) the Disgust Scale Revised^{18,19}, which assesses individual differences in the tendency to react to a variety of situations with disgust ($\alpha_{\text{total}}=0.86$), (2) the willpower and dislike subscales of the Anti-Fat Attitudes scale,⁴ which assesses people's beliefs about the extent to which obesity is under personal control and their general attitude toward obese people, respectively ($\alpha_{\text{willpower}}=0.73$, $\alpha_{\text{dislike}}=0.84$); and (3) a single-item measure of weight bias ('I strongly prefer thin people to fat people'; 1 = *Strongly disagree*, 7 = *Strongly agree*). Finally, participants reported their height, weight, age, and sex.

Results

Before assessing the connection between control beliefs, disgust, and favorability ratings of obese individuals, the validity of the favorability and the control measures were verified by examining their correlations with other indices of attitudes toward obese people and beliefs about the controllability of body weight. Favorability ratings of obese individuals were negatively correlated with the dislike subscale of the Anti-Fat Attitudes scale ($r=-0.40$, $P<0.001$), and also with a single-item measure of preference for thin people over fat people ($r=-0.31$, $P<0.001$). In addition, ratings of perceived control were correlated with the willpower subscale of the Anti-Fat Attitudes scale ($r=0.37$, $P<0.001$). These results support the validity of the measures used in this study.

Disgust and perceived control in attitudes toward obese people.

Both perceived control ($r=-0.18$, $P=0.002$) and disgust ($r=-0.52$, $P<0.001$) were negatively correlated with ratings of how favorable participants found obese people. Mediation analysis was then conducted following the steps outlined by Baron and Kenny²⁰ to determine whether perceptions of disgust mediated the link between perceived control and favorability ratings: (1) control was a significant predictor of favorability ($\beta=-0.18$, $P=0.002$); (2) control was significantly associated with disgust (the proposed mediator) ($\beta=0.24$, $P<0.001$); (3) disgust was a significant predictor of favorability when control was also in the model ($\beta=-0.50$, $P<0.001$); and (4) the association between control and favorability was no longer significant when disgust was included in the model ($\beta=-0.05$, $P=0.30$). Thus, disgust fully mediated the relation between control and favorability. The Sobel test for mediation, using the SPSS syntax provided by Preacher and Hayes,²¹ showed that mediation was significant, Sobel's $Z=3.92$, $P<0.001$. The alternative model, with control as the mediator of the link between disgust and favorability, was not significant, Sobel's $Z=0.98$, $P=0.33$.

A follow-up regression analysis was conducted with disgust and control as predictors of favorability ratings, along with BMI, age, disgust sensitivity, and the willpower subscale of the Anti-Fat Attitudes scale as possible covariates. The overall model was significant, $F(6, 287) = 20.59, P < 0.001$, accounting for 30% of the variance in favorability ratings. Disgust was the strongest predictor of favorability ratings ($\beta = -0.46, P < 0.001$), although BMI ($\beta = 0.13, P = 0.01$) and age ($\beta = 0.11, P = 0.03$) both emerged as significant independent predictors.

Perceptions of obese people compared with other social groups.

Table 1 shows the mean ratings for favorability, perceived control, and disgust for each of the 16 social groups (ratings for obese people are shown in bold). With respect to favorability ratings, obese people were rated significantly below the mid-point of the scale (that is below a rating of 5; $t = 9.21, P < 0.001$), indicating overall negative attitudes toward the obese. Attitudes toward obese people did not differ from attitudes toward homeless people and politicians, but were less negative than attitudes toward smokers and drug addicts. For judgments of personal control, obese people were rated as having more control over their group membership than did women, homosexuals, and welfare recipients, for example, but less personal control than smokers, drug addicts, and religious people. Finally, for disgust ratings, only drug addicts and smokers were seen as more disgusting than obese people (although obese people were rated just as disgusting as politicians).

To examine the associations among judgments of control, disgust, and favorability across all social groups, the mean scores for each social group across all participants were used in correlation and regression analyses (a similar approach was used by Gray *et al.*²² and Gray and Wegner²³). Both personal control ($r = -0.54, P = 0.03$) and disgust ($r = -0.90, P < 0.001$) were negatively correlated with favorability ratings. In addition, control and disgust were positively correlated with

one another ($r = 0.66, P = 0.005$) (see Figure 1). Mediation analysis revealed that (1) control was a significant predictor of favorability ($\beta = -0.54, P = 0.03$); (2) control was significantly associated with disgust (the proposed mediator) ($\beta = 0.66, P = 0.005$); (3) disgust was a significant predictor of favorability when control was also in the model ($\beta = -0.96, P < 0.001$); and (4) the association between control and favorability was no longer significant when disgust was included in the model ($\beta = 0.09, P = 0.59$). Thus, disgust mediated the relation between control and favorability, Sobel's $Z = 2.84, P = 0.005$. The alternative model, with control as the mediator of the link between disgust and favorability, was not significant, Sobel's $Z = 0.53, P = 0.59$.

Discussion

These results confirm the primary hypothesis that disgust would be an important component of judgments of obese people. Past research has focused on perceptions of control

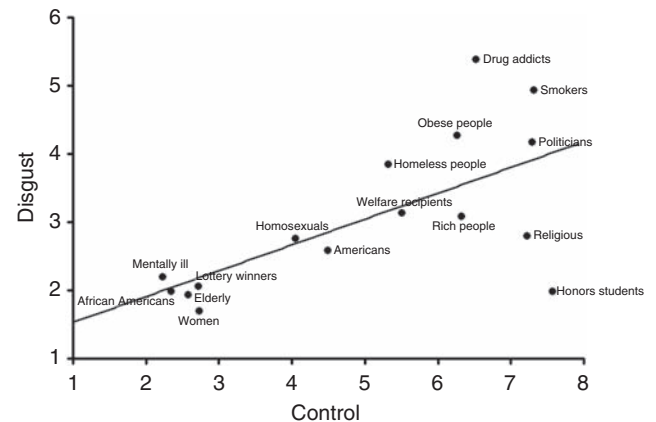


Figure 1 Disgust ratings as a function of perceived control.

Table 1 Mean ratings for favorability, control, and disgust

Favorable		Control		Disgust	
Group	Mean (s.d.)	Group	Mean (s.d.)	Group	Mean (s.d.)
Women	7.09 (1.70) ^a	Honors students	7.58 (1.64) ^a	Drug addicts	5.37 (2.36) ^a
Americans	6.57 (1.85) ^b	Smokers	7.37 (1.83) ^{a,b}	Smokers	4.95 (2.53) ^b
Elderly	6.18 (1.67) ^c	Politicians	7.30 (1.91) ^b	Obese people	4.29 (2.23)^c
Honors students	6.09 (1.68) ^c	Religious people	7.24 (1.76) ^c	Politicians	4.17 (2.33) ^c
African Americans	5.98 (1.82) ^c	Drug addicts	6.56 (2.07) ^c	Homeless people	3.84 (2.12) ^d
Rich people	5.19 (1.58) ^d	Rich people	6.32 (1.78) ^{c,d}	Welfare recipients	3.14 (2.02) ^e
Homosexuals	5.18 (2.07) ^d	Obese people	6.28 (1.78)^d	Rich people	3.10 (1.82) ^e
Lottery winners	5.12 (1.46) ^d	Welfare recipients	5.51 (1.95) ^e	Religious people	2.79 (2.03) ^f
Mentally ill	5.09 (1.72) ^d	Homeless people	5.36 (1.87) ^e	Homosexuals	2.78 (2.39) ^f
Religious people	5.05 (1.80) ^d	Americans	4.48 (2.67) ^f	Americans	2.59 (1.91) ^f
Welfare recipients	4.41 (1.60) ^e	Homosexuals	4.06 (2.77) ^g	Mentally ill	2.18 (1.62) ^g
Obese people	4.14 (1.61)^f	Women	2.73 (2.72) ^h	Lottery winners	2.07 (1.61) ^{g,h}
Politicians	4.12 (1.61) ^f	Lottery winners	2.70 (2.28) ^h	Honors students	1.98 (1.62) ^{g,h}
Homeless people	4.02 (1.72) ^f	Elderly	2.56 (2.46) ^{h,i}	African Americans	1.97 (1.50) ^h
Smokers	3.70 (1.85) ^g	African Americans	2.33 (2.39) ^{h,i}	Elderly	1.95 (1.39) ^h
Drug addicts	2.88 (1.67) ^h	Mentally ill	2.22 (1.49) ⁱ	Women	1.70 (1.41) ⁱ

Means within a column with different superscripts are significantly different at $P < 0.05$.

over body weight as a determinant of attitudes toward obese individuals, and this study showed that disgust mediated that association. Although disgust was the strongest predictor of attitudes, participant characteristics such as BMI and age were also associated with attitudes toward obese individuals. Consistent with earlier research, leaner participants and younger participants had more negative attitudes toward obese individuals.^{6,8} This study also showed that obese people are among the most negatively viewed social groups. Interestingly, across all social groups, perceptions of control over group membership predicted ratings of disgust, and disgust predicted favorability ratings. The next two studies sought to replicate the key finding of disgust as a mediator of the association between perceived control and attitude toward obese people.

Study 2

Method

The design of Study 2 was identical to that of Study 1, except that participants made their judgments with respect to 'fat people' rather than 'obese people.' Participants were 125 undergraduate students (70 men, 55 women) from a large private university in the northeastern United States. Their mean age was 19.46 years (s.d. = 1.98) and their mean BMI was 23.87 (s.d. = 3.78).

Results and discussion

Mediational analysis was conducted to examine disgust as a mediator of the association between perceived control and favorability ratings for fat people as a target group. Results showed that (1) perceived control was a significant predictor of favorability ($\beta = -0.22$, $P = 0.02$); (2) control was significantly associated with disgust (the proposed mediator) ($\beta = 0.34$, $P < 0.001$); (3) disgust was a significant predictor of favorability when control was also in the model ($\beta = -0.47$, $P < 0.001$); and (4) the association between control and favorability was no longer significant when disgust was included in the model ($\beta = -0.06$, $P = 0.48$). Thus, disgust fully mediated the relation between control and favorability, Sobel's $Z = 3.17$, $P = 0.002$. The alternative model, with control as the mediator of the link between disgust and favorability, was not significant, Sobel's $Z = 0.67$, $P = 0.50$. The findings of this study using 'fat people' as a target group were identical to those observed in Study 1 using 'obese people' as a target group, and provide further support for the role of disgust in predicting attitudes toward individuals who have a larger body size. Unlike Study 1, however, BMI and age were not significant predictors of attitudes toward fat people.

Study 3

The first two studies were conducted using the same population of students from the United States. The purpose

of Study 3 was to determine whether the same pattern of results would be observed with a sample of Australian undergraduate students. In addition, Study 3 used different measures of perceived control, disgust, and attitudes toward obese people.

Method

Participants were 99 undergraduate students (35 men, 64 women) at a large public university in eastern Australia who took part in exchange for credit in their first year psychology course. Their mean age was 19.24 years (s.d. = 1.36) and their mean BMI was 21.07 (s.d. = 3.24). As part of a larger study, participants completed the willpower subscale of Anti-fat Attitudes scale, which was used as a measure of perceptions of control over body weight. Participants also completed a single-item measure of disgust toward fat people ('I find fat people disgusting'; 1 = *Strongly disagree*, 7 = *Strongly agree*). Finally, participants completed the dislike subscale of the Anti-Fat Attitudes scale and a single-item measure of preference for thin people over fat people ('I strongly prefer thin people to fat people'; 1 = *Strongly agree*, 7 = *Strongly disagree*) as indices of attitudes toward fat people.

Results and discussion

Separate mediational analyses were conducted with the dislike subscale of the Anti-Fat Attitudes scale and with the single-item preference measure as outcome variables. Note that these indices of attitudes are interpreted in the direction opposite to the favorability ratings described in Studies 1 and 2.

The first mediational analysis with dislike as the outcome variable showed that (1) willpower was a significant predictor of dislike ($\beta = 0.36$, $P < 0.001$); (2) willpower was significantly associated with disgust (the proposed mediator) ($\beta = 0.40$, $P < 0.001$); (3) disgust was a significant predictor of dislike when willpower was also in the model ($\beta = 0.56$, $P < 0.001$); and (4) the association between willpower and dislike was no longer significant when disgust was included in the model ($\beta = 0.14$, $P = 0.13$). Thus, disgust mediated the relation between willpower and dislike, Sobel's $Z = 3.55$, $P < 0.001$. The alternative model, with willpower as the mediator of the link between disgust and dislike, was not significant, Sobel's $Z = 1.38$, $P = 0.16$. Neither BMI nor age was a significant predictor of dislike.

The second mediational analysis with preference as the outcome variable showed that (1) willpower was a significant predictor of preference ($\beta = 0.20$, $P = 0.04$); (2) willpower was significantly associated with disgust (the proposed mediator) ($\beta = 0.40$, $P < 0.001$); (3) disgust was a significant predictor of preference when willpower was also in the model ($\beta = 0.49$, $P < 0.001$); and (4) the association between willpower and preference was no longer significant when disgust was included in the model ($\beta = 0.01$, $P = 0.95$). Thus, disgust

mediated the relation between willpower and preference, Sobel's $Z=3.26$, $P=0.001$. The alternative model, with willpower as the mediator of the link between disgust and preference, was not significant, Sobel's $Z=1.01$, $P=0.31$. BMI was a significant predictor of preference ($\beta=-0.25$, $P=0.006$), but age was not ($\beta=-0.03$, $P=0.77$).

The pattern of findings from the mediational analyses in this study was identical to that observed in Studies 1 and 2. These findings emerged using slightly different measures of perceived control, of disgust, and of attitudes, and using an Australian sample. Thus, disgust seems to be a robust predictor of weight bias.

General Discussion

The aims of this research were to (1) examine the role of disgust and perceived control in evaluations of obese individuals, and (2) to determine how evaluations of obese people compared with evaluations of other social groups. Results from three studies indicated that disgust was the strongest predictor of attitudes toward obese individuals, and that disgust mediated the association between perceived control and attitudes toward obese people. These results held even when controlling for individual differences in disgust sensitivity, and an identical pattern of results was observed across study variations, including group labels (obese people and fat people), the measures used to assess perceived control, disgust, and attitudes toward obese people, and the country where the study was conducted (United States and Australia). Thus, the results of these three studies provide strong evidence for disgust as a predictor of negative attitudes toward obese people. This connection between disgust and attitudes toward obese people is also consistent with other research, indicating that obese individuals elicit a disgust response.^{15,17} Together, these studies suggest that disgust can be an important component of understanding negative attitudes toward obese individuals. In particular, future research focusing on disgust as an emotional response to obese individuals might help explain why negative attitudes toward obese individuals are so resistant to change.^{5,10} Earlier research has suggested that leaner individuals and younger individuals have more negative attitudes toward obese people,^{6,8} but this pattern was not consistently found in these studies. The discrepant results with earlier research are possibly due to the relatively narrow range of age and BMI found in the university samples included in this research compared with the community samples used in the studies by Schwartz *et al.*

Weight bias has been described as the last acceptable form of discrimination. Comparing judgments of obese people with a variety of other social groups revealed that obese people were rated as more disgusting than all but two of the social groups (drug addicts and smokers), and were among the groups who received the lowest favorability ratings. These findings highlight the seriousness of weight bias, and

emphasize the importance of efforts aimed at reducing weight bias. These findings also situate representations of obesity in a broader context by establishing similarities with representations of other social groups. Specifically, perceived control over group membership showed a strong linear relation with ratings of disgust across social groups, and disgust fully mediated the relation between perceived control and favorability ratings. Thus, the mechanisms underlying judgments of obese individuals seem to be similar to those underlying the judgments of other social groups.

The present results highlight the potential for disgust as a determinant of weight bias, but also raise the following two important questions: How did obesity come to be linked with disgust, and what are the implications of this link for efforts to reduce weight bias? There are at least two possible approaches to answering these questions. First, disgust has been described as a disease-avoidance mechanism,²⁴ and entities that could potentially be carriers of disease elicit a disgust reaction and are rejected or avoided. Research has shown that obese individuals are seen as having poor personal hygiene,² and that obesity is implicitly associated with disease-related concepts.²⁵ Thus, there is some suggestive evidence that obese people might be seen as carriers of communicable disease. Additional evidence that obesity is seen as a contaminant comes from research describing a 'stigma by association' process, in which being in physical proximity to an obese individual has a negative impact on people's evaluations of the bystander.²⁶ Park *et al.*²⁵ suggested that such biases resulted from signal-detection errors in an otherwise adaptive pathogen-detection system. In this case, correcting some of these errors might have positive results with respect to evaluations of obese individuals.

A second perspective is based on the work of Rozin,²⁷ who described disgust as being related to a process of moralization in which preferences are converted to moral values. Disgust is elicited from objects that violate those values. The example of cigarette smoking illustrates how this process can change over time: there is stronger antipathy and disgust toward cigarette smoking in recent times than there was in the 1950s.²⁸ A similar process of moralization can be applied to the stigma of obesity. Attractiveness standards have shifted over time, with more curvaceous figures being preferred in the beginning of the 20th century and again in the 1950s, but more slender ideals being prominent in the 1920s and continually since the 1980s.²⁹ In parallel with this latter trend, attitudes toward obese individuals are worse today than they were 40 years ago.³⁰ It is possible that these body-type preferences over time have also become moral values, and that those who violate this moral value elicit a disgust response. Efforts to change negative attitudes toward obese individuals, therefore, might work toward reversing this moralization process and reducing the moral value placed on leaner body types. Rozin²⁷ noted that somewhat of a reversal has occurred for homosexuality, which might hold promise for ameliorating judgments of obese people.

This research indicates that disgust is an important component of the evaluations of obese people (as well as a number of other social groups). It is important to note, however, that evaluations were obtained as self-reports, and were assessed with reference to group labels in the abstract. It is, therefore, unclear to what extent these ratings correspond with individuals' actual emotional experiences when encountering an obese individual (or member of any of the represented social groups). Future research examining the emotional and behavioral reactions to obese individuals would be valuable in determining how disgust impacts interpersonal interactions and discrimination against stigmatized individuals.

Conflict of interest

The author declares no conflict of interest.

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References

- 1 Goffman I. *Stigma: Notes on the Management of Spoiled Identity*. Englewood Cliffs: Prentice Hall, NJ, 1963.
- 2 Puhl R, Brownell KD. Bias, discrimination, and obesity. *Obes Res* 2001; **9**: 788–805.
- 3 Flegal KM, Carroll MD, Ogden CL, Johnson CL. Prevalence and trends in obesity among US adults, 1999–2000. *JAMA* 2002; **288**: 1723–1727.
- 4 Crandall CS. Prejudice against fat people: ideology and self-interest. *J Pers Soc Psychol* 1994; **66**: 882–894.
- 5 Teachman BA, Gapinski KD, Brownell KD, Rawlins M, Jeyaram S. Demonstrations of implicit anti-fat bias: the impact of providing causal information and evoking empathy. *Health Psychol* 2003; **22**: 68–78.
- 6 Schwartz MB, Vartanian LR, Nosek BA, Brownell KD. The influence of one's own body weight on implicit and explicit anti-fat bias. *Obesity* 2006; **14**: 440–447.
- 7 Cramer P, Steinwert T. Thin is good, fat is bad: how early does it begin? *J Appl Dev Psychol* 1998; **19**: 429–451.
- 8 Schwartz MB, Chambliss HO, Brownell KD, Blair SN, Billington C. Weight bias among health professionals specializing in obesity. *Obes Res* 2003; **11**: 1033–1039.
- 9 Yang W, Kelly T, He J. Genetic epidemiology of obesity. *Epidemiol Rev* 2007; **29**: 49–61.
- 10 Anesbury T, Tiggemann M. An attempt to reduce negative stereotyping of obesity in children by changing controllability beliefs. *Health Edu Res* 2000; **15**: 145–152.
- 11 Cottrell CA, Neuberg SL. Different emotional reactions to different groups: a sociofunctional threat-based approach to 'prejudice'. *J Pers Soc Psychol* 2005; **88**: 770–789.
- 12 Fiske ST, Cuddy AC, Glick P, Xu J. A model of (often mixed) stereotype content: competence and warmth follow from perceived status and competition. *J Pers Soc Psychol* 2002; **82**: 878–902.
- 13 Taylor K. Disgust is a factor in extreme prejudice. *Br J Soc Psychol* 2007; **46**: 597–617.
- 14 Rozin P, Haidt J, McCauley CR. Disgust. In: Lewis M, Haviland-Jones JM (eds). *Handbook of Emotions*, 2nd edn. Guilford Press: New York, 2000. pp 637–653.
- 15 Harvey T, Troop NA, Treasure JL, Murphy T. Fear, disgust, and abnormal eating attitudes: a preliminary study. *Int J Eat Disord* 2002; **32**: 213–218.
- 16 Hodson G, Costello K. Interpersonal disgust, ideological orientations, and dehumanization as predictors of intergroup attitudes. *Psychol Sci* 2007; **18**: 691–698.
- 17 Krendl AC, Macrae NC, Kelley WM, Fugelsang JA, Heatherton TF. The good, the bad, and the ugly: an fMRI investigation of the functional anatomic correlates of stigma. *Soc Neurosci* 2006; **1**: 5–15.
- 18 Haidt J, McCauley C, Rozin P. Individual differences in sensitivity to disgust: a scale sampling seven domains of disgust elicitors. *Pers Individ Dif* 1994; **16**: 701–713.
- 19 Olatunji BO, Williams NL, Tolin DF, Sawchuck CN, Abramowitz JS, Lohr JM *et al*. The disgust scale: item analysis, factor structure, and suggestions for refinement. *Psychol Assess* 2007; **19**: 281–297.
- 20 Baron RM, Kenny DA. The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *J Pers Soc Psychol* 1986; **51**: 1173–1182.
- 21 Preacher KJ, Hayes AF. SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behav Res Methods Instrum Comput* 2004; **36**: 717–731.
- 22 Gray H, Gray K, Wegner DM. Dimensions of mind perception. *Science* 2007; **315**: 619.
- 23 Gray K, Wegner DM. Moral typecasting: divergent perceptions of moral agents and moral patients. *J Pers Soc Psychol* 2009; **96**: 505–520.
- 24 Oaten M, Stevenson RJ, Case TI. Disgust as a disease-avoidance mechanism. *Psychol Bull* 2009; **135**: 303–321.
- 25 Park JH, Schaller M, Crandall CS. Pathogen-avoidance mechanisms and the stigmatization of obese people. *Evo Hum Behav* 2007; **28**: 410–414.
- 26 Hebl MR, Mannix LM. The weight of obesity in evaluating others: a mere proximity effect. *Pers Soc Psychol Bull* 2003; **29**: 28–38.
- 27 Rozin P. The process of moralization. *Psychol Sci* 1999; **10**: 218–221.
- 28 Rozin P, Singh L. The moralization of cigarette smoking in the United States. *J Consum Psychol* 1999; **8**: 321–337.
- 29 Silverstein B, Peterson B, Purdue L. Some correlates of the thin standard of physical attractiveness of women. *Int J Eat Disord* 1986; **5**: 898–905.
- 30 Latner JD, Stunkard AJ. Getting worse: the stigmatization of obese children. *Obes Res* 2003; **11**: 452–456.