

ORIGINAL ARTICLE

Changes in weight bias following weight loss: the impact of weight-loss method

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Background: Many obese individuals lose weight to reduce weight stigma; however, little is known about whether other people's attitudes actually improve towards obese individuals after they have lost weight, and whether changes in attitudes depend on the method of weight loss. This study examined changes in people's perceptions of an obese target who had lost weight through diet and exercise or through surgery.

Method: Participants ($N=73$) initially viewed an image of an obese woman or a thin woman (control condition), and were asked to indicate their perceptions of the target with respect to the target's behaviors (for example, how often she exercises), as well as some personality characteristics (for example, lazy, sloppy and competent). Participants then viewed a more recent image of the target in which she had lost weight, and were informed that the target had lost weight through diet and exercise or through surgery, or were not provided with any explanation for the weight loss. Participants once again indicated their impression of the target on the same measures.

Results: Regardless of the method of weight loss, all targets were rated as eating more healthily, exercising more, and being more competent and less sloppy after having lost weight. Participants also rated the target as less lazy when they learned that she had lost weight through diet and exercise, or when no information was provided about the method of weight loss; the target who lost weight through surgery, however, was not seen as being any less lazy after losing weight.

Conclusion: These findings indicate that perceptions of obese individuals can in fact improve after they have lost weight, but that this might depend on the method of weight loss.

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Obesity is a major health problem in many countries around the world. For example, more than 32% of the adult population in the United States is obese¹ and 25% of Australian adults are obese.² Overweight and obese individuals have an increased risk of serious medical conditions, such as cardiovascular disease, diabetes, osteoarthritis and certain types of cancer.³ In addition to the health consequences associated with obesity, there is clear and consistent evidence of bias and discrimination against obese people in a variety of domains, including employment, health care, education and relationships.⁴ Obese individuals are commonly stereotyped as being lazy, sloppy, incompetent, and as lacking self-control and willpower.⁵ Negative attitudes and stereotypes of obese people are found both explicitly and implicitly,^{6,7} and are observed in the general

population,⁸ as well as among children,⁹ health care professionals^{10,11} and obese individuals themselves.¹²

Weight loss among individuals who are overweight and obese has clear benefits in terms of reducing their risk of the medical consequences associated with excess weight,^{13,14} but what impact does weight loss have on weight bias? The information available on this question is limited. One study showed that participants who viewed 'before-and-after' weight-loss advertisements reported more negative impressions of the target individual, as well as increased belief that body weight is easily controllable, compared with participants who viewed only the 'before' and only the 'after' weight-loss images.¹⁵ Another study showed that participants had particularly strong dislike for overweight individuals who had recently lost weight, compared with overweight individuals without recent weight loss and compared with normal weight individuals.¹⁶ Although these studies suggest that learning about someone's weight loss might actually result in more negative impressions of that individual, it is possible that the means through which an individual has achieved weight loss also influences people's

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judgments of that person. For example, there is evidence that people's perceptions of the effort an individual exerts to obtain his or her personal outcomes influences impressions of that individual.¹⁷ From a weight-loss perspective, exercise and dieting might be seen as involving more personal effort than surgery, and could therefore result in different perceptions of the individual who has lost weight. Specifically, individuals who achieve weight loss through surgery may be viewed more negatively than individuals who achieve weight loss through dieting and exercise.

Weight-loss surgery, such as gastric bypass surgery, is the most effective treatment available for weight loss among obese individuals,^{18,19} and the use of weight-loss surgery has dramatically increased over the past decade.³ Of particular relevance to the present research, a study of obese patients undergoing gastric restriction surgery for morbid obesity indicated that 59% of patients requested the surgery primarily for social reasons, such as embarrassment, and only 10% were obtaining surgery primarily for medical reasons.²⁰ Furthermore, following weight-loss surgery, previously obese individuals reported experiencing less discrimination and increased psychological functioning.²⁰⁻²³ There has been very little research, however, investigating other peoples' impressions of obese individuals following obesity surgery.

In one study investigating differences in attitudes based on weight-loss method, participants were shown an image of a normal-weight woman, and were informed that the target was previously overweight and had lost weight through surgery, through dieting and exercising, or were not told that the woman was previously overweight.²⁴ Participants rated the woman as more healthy and more physically attractive when they learned that she had lost weight through diet and exercise than when she lost weight through surgery, but there were no differences between weight-loss methods in terms of how likeable the target was. On the basis of these results, Mattingly *et al.*²⁴ suggested that individuals who lose weight through surgery might continue to be treated like an overweight person because they continue to be seen as lazy, and lacking willpower and personal responsibility. That study, however, did not examine changes in impressions of the target from pre-weight loss to post-weight loss, and those data therefore cannot speak to how people's impressions of an individual change as a function of losing weight.

In summary, past research suggests that negative attitudes towards overweight and obese people might persist even after those individuals lose weight, although the means through which weight loss was achieved might be an important determinant of attitudes toward the target. The purpose of this study is to investigate (1) whether there is a change in participants' impressions of a previously obese target from pre-weight loss to post-weight loss, and (2) whether impressions of the target differ as a function of weight-loss method. We hypothesized that participants would rate the target more positively after learning that she had lost weight. We also predicted, however, that

impressions of the target would be more positive when she lost weight through dieting and exercise compared with when she lost weight through surgery.

Materials and methods

Participants

Seventy-three first-year psychology students (42 women, 31 men) at a large public university in eastern Australia participated in this study. The mean age was 19.08 (s.d. = 1.24) and mean body mass index (BMI) was 21.89 (s.d. = 2.87). Participants were given course credit for their participation and provided their written consent before commencing the study. The University's ethics committee approved this study.

Procedure

Participants were tested in groups of up to three individuals, with each participant seated in a private cubicle. On arrival, participants were told that they would be completing a social judgments task on the computer. Participants were randomly assigned to one of four conditions (three experimental conditions and one control condition). All participants were shown an initial image of a female target named Susan, along with a brief description of her demographic information (for example, Susan is 34 years old) and daily activities (for example, she owns a pet and enjoys shopping). Participants in the three experimental conditions saw an image of the target when she was obese (actual BMI = 39.9); participants in the control condition saw an image of the target when she had already lost weight (actual BMI = 22.1). Both of the images presented were of the same individual before and after weight loss. In both images, the woman was dressed in similar attire, smiling and standing in the same position against a neutral background. The images were taken from a website displaying numerous before-and-after weight-loss photographs, which also provided height and weight information (including amount of weight lost) for each individual. After viewing the image and reading the information about Susan, participants completed a series of ratings of the target.

Inferences about target's behavior. Four behavioral questions were used to gauge participants' impressions of Susan's eating and exercise behavior. Participants responded to the following questions: (1) 'What percentage of the time do you think that Susan would walk to work?' (2) 'What percentage of the time do you think that Susan would choose fruit and vegetables as a snack?' and (3) 'What percentage of the time do you think that Susan would choose chocolate, chips or lollies (the term 'lollies' is an Australian expression referring to confectionary) as a snack?' Responses to these questions were made on a 6-point scale with each point representing a 20% increment (0 = *Never*, 100 = *Always*). Participants

responded to the question 'How many times a week do you think that Susan exercises?' on a 7-point scale (1=0, 7=6+). The presentation of these four questions was randomized.

Stereotypes. Participants indicated their perception of Susan on 13 personality traits. Two traits represented common obesity stereotypes: *lazy* and *sloppy*. The remaining 11 traits were chosen to represent the two core dimensions of person perception, warmth and competence.²⁵ The traits *successful*, *efficient*, *competent* and *intelligent* were used to assess judgments of competence (Cronbach's $\alpha=0.76$), and the traits *likeable*, *popular*, *polite*, *generous*, *aggressive* (reverse coded), *shy* and *irritable* (reverse coded) were used to assess judgments of warmth (Cronbach's $\alpha=0.71$). Each trait was rated on a 6-point scale (1=Not at all, 6=Extremely). The order of presentation for each of these traits was randomized.

After completing these initial measures, participants were told that they would be shown some more recent information about Susan. Participants saw a new photograph of Susan, some updated demographic information (for example, Susan is now 35), and specific information consistent with their assigned condition. All participants were shown an image of Susan after she had lost weight (participants in the control condition saw the same image that they had seen initially). Participants in the *effort* condition read that Susan 'started to eat more healthily, joined a gym and exercised regularly. Due to Susan's healthy lifestyle, she lost 45 kilograms over a one year period.' Participants in the *surgery* condition learned that Susan 'visited an obesity clinic and organized to have gastric bypass surgery. After surgery, Susan lost 45 kilograms over a one year period.' Although people are often aware of the fact that another person has lost weight, they might not have knowledge of *how* that person has lost weight. For this reason, a *no-information* condition was added to this study to assess the assumptions that people make about weight-loss methods. Participants in the no-information condition were simply told that Susan had lost 45 kg over a 1-year period, but were not given any explanation for the weight loss. Participants in the control condition received no additional information about Susan.

After viewing the updated information about Susan, participants completed the same behavioral inference and stereotype measures. Finally, participants were asked to report their age, sex, and height and weight (which were used to calculate their BMI). Participants were then fully debriefed.

Results

Before conducting any analyses, the data were checked for outliers using boxplots. One participant was identified as a

multivariate outlier and was subsequently removed from further analysis. For each outcome variable, mixed-model analyses of variance were conducted with weight-loss condition (*effort vs surgery vs no information vs control*) as the between-subjects factor and assessment point (*baseline vs follow-up*) as the within-subjects factor. Of particular importance to our hypotheses was any observed change in ratings of Susan from baseline to follow-up for each condition. Secondary comparisons were also conducted examining differences across groups at baseline and at follow-up. See Table 1 for means and s.d.'s. For all analyses reported below, the pattern of results did not change when controlling for participants' BMI.

Table 1 Mean (s.d.) for judgments of the target at baseline and follow-up

Measure	Condition			
	Effort	Surgery	No information	Control
Behavioral inferences				
Exercise				
Baseline	2.55 (0.95) ^a	2.17 (0.79) ^a	2.50 (1.24) ^a	3.93 (0.88) ^b
Follow-up	5.45 (1.10) ^c	4.11 (1.32) ^b	5.20 (0.89) ^c	3.87 (0.99) ^b
Cohen's <i>d</i>	2.83	1.84	2.84	-0.06
Walking to work				
Baseline	2.20 (0.77) ^a	2.00 (0.77) ^a	2.30 (1.17) ^a	2.47 (1.25) ^a
Follow-up	3.70 (0.80) ^b	3.50 (1.34) ^b	3.50 (0.89) ^b	2.33 (1.18) ^b
Cohen's <i>d</i>	1.91	1.42	1.17	-0.08
Fruit as snack				
Baseline	2.80 (0.83) ^a	2.83 (0.99) ^a	2.50 (0.89) ^a	4.13 (0.64) ^b
Follow-up	4.45 (0.88) ^b	4.44 (0.86) ^b	4.20 (0.95) ^b	4.00 (0.76) ^b
Cohen's <i>d</i>	1.93	1.74	1.85	-0.19
Junk food as snack				
Baseline	4.20 (0.95) ^a	4.33 (0.97) ^a	4.15 (0.81) ^a	2.80 (0.77) ^b
Follow-up	2.05 (0.60) ^b	2.33 (0.91) ^b	2.60 (1.10) ^b	2.73 (0.88) ^b
Cohen's <i>d</i>	-2.77	-2.13	-1.62	-0.08
Stereotypes				
Lazy				
Baseline	2.90 (1.25) ^a	2.72 (1.13) ^a	3.00 (0.86) ^a	1.60 (0.83) ^b
Follow-up	1.75 (0.55) ^b	2.33 (1.14) ^{a,b}	2.20 ^b (0.95)	1.93 (1.03) ^b
Cohen's <i>d</i>	-1.28	-0.34	-0.88	0.35
Sloppy				
Baseline	2.45 (1.10) ^a	2.61 (1.14) ^a	2.90 (0.91) ^a	1.40 (0.63) ^b
Follow-up	1.90 (0.72) ^b	2.00 (0.97) ^b	2.10 (0.72) ^b	1.50 (0.74) ^b
Cohen's <i>d</i>	-0.60	-0.58	-0.98	0.15
Competence				
Baseline	3.81 (0.88) ^a	4.14 (0.67) ^b	3.81 (0.57) ^a	4.28 (0.54) ^b
Follow-up	4.48 (0.58) ^b	4.58 (0.56) ^b	4.29 (0.57) ^b	4.35 (0.84) ^b
Cohen's <i>d</i>	0.91	0.72	0.83	0.10
Warmth				
Baseline	4.36 (0.70)	4.52 (0.51)	4.26 (0.41)	4.47 (0.52)
Follow-up	4.52 (0.66)	4.52 (0.48)	4.24 (0.50)	4.48 (0.49)
Cohen's <i>d</i>	0.24	0.00	-0.04	0.02

Note: For each measure, means within a row or within a column with a different superscript alphabet differ at $P<0.05$.

Behavioral inferences

Exercise. There was a significant main effect of assessment point, $F(1, 69) = 142.46$, $P < 0.001$, a significant main effect of weight-loss condition, $F(3, 69) = 4.42$, $P = 0.01$, and significant assessment-point X weight-loss condition interaction, $F(3, 69) = 17.01$, $P < 0.001$. Simple effects analysis revealed that participants in the *effort*, *surgery* and *no information* conditions rated Susan as exercising more frequently after weight loss than before weight loss; there was no difference from baseline to follow-up in the control condition. Furthermore, at baseline, participants in the experimental conditions rated Susan as exercising significantly less frequently than did participants in the control condition. At follow-up, however, participants in the *effort* and *no information* conditions rated Susan as exercising significantly more frequently than did participants in the *surgery* condition and participants in the control condition (the *surgery* and control conditions did not differ from one another at follow-up).

Walking to work. There was no main effect of weight-loss condition, $F(3, 69) = 1.51$, $P = 0.22$, but there was a significant main effect of assessment point, $F(1, 69) = 48.25$, $P < 0.001$, and a significant interaction between assessment point and weight-loss condition, $F(3, 69) = 6.28$, $P = 0.001$. Simple effects analysis revealed that participants in the *effort*, *surgery* and *no information* conditions rated Susan as walking to work more frequently after weight loss than before weight loss, but there was no difference from baseline to follow-up for the control condition. Furthermore, at baseline, there were no differences across any conditions; at follow-up, however, participants in the three experimental conditions (*effort*, *surgery* and *no information*) rated Susan as walking to work even more frequently than did participants in the control condition.

Fruit as snack. There was a significant main effect of assessment point, $F(1, 69) = 60.94$, $P < 0.001$, a significant main effect of weight-loss condition, $F(3, 69) = 4.65$, $P = 0.01$, and a significant assessment-point X weight-loss condition interaction, $F(3, 69) = 7.40$, $P < 0.001$. Simple effects analysis showed that participants in the *effort*, *surgery* and *no information* conditions rated Susan as eating fruit as a snack significantly more often after weight loss than before weight loss; no difference was found for the control condition. Furthermore, at baseline, participants in the experimental conditions rated Susan as eating significantly less fruit than did those in the control condition. At follow-up, however, there were no differences among the groups.

Junk food as snack. There was a significant main effect of assessment point, $F(1, 69) = 98.87$, $P < 0.001$, a significant effect of weight-loss condition, $F(3, 69) = 3.09$, $P = 0.03$, and a significant assessment-point X weight-loss condition interaction, $F(3, 69) = 9.64$, $P < 0.001$. Simple effects analysis

showed that those in the *effort*, *surgery* and *no information* conditions rated Susan as eating junk food as a snack significantly more often before weight loss than after weight loss; no difference was found for the control condition. Furthermore, at baseline, participants in the three experimental conditions rated Susan as eating significantly more junk food than did those in the control condition. At follow-up, however, there were no differences among the groups.

Stereotypes

Lazy. There was a significant main effect of assessment point, $F(1, 69) = 11.02$, $P = 0.001$, a significant main effect of weight-loss condition, $F(3, 69) = 4.10$, $P = 0.01$, and a significant assessment-point X weight-loss condition interaction, $F(3, 69) = 4.18$, $P = 0.01$. Simple effects analysis showed that participants in the *effort* and *no information* conditions rated Susan as significantly less lazy after weight loss than before weight loss; there was no difference for participants in the *surgery* condition or the control condition. In addition, at baseline, participants in all of the experimental conditions rated Susan as being significantly more lazy than participants in the control condition. No differences between any of the groups were found at follow-up.

Sloppy. There was a significant main effect of assessment point, $F(1, 69) = 15.68$, $P < 0.001$, a significant main effect of weight-loss condition, $F(3, 69) = 5.93$, $P = 0.001$, and a significant assessment-point X weight-loss condition interaction, $F(3, 69) = 2.81$, $P = 0.05$. Simple effects analysis showed that participants in the *effort*, *surgery* and *no information* conditions rated Susan as significantly less sloppy after weight loss than before weight loss; there was no difference in the control condition. Furthermore, at baseline, all three of the experimental conditions differed significantly from the control condition; at follow-up, however, there were no differences among the groups.

Competence. There was no main effect of weight-loss condition found, $F(3, 69) = 1.23$, $P = 0.31$, but there was a significant main effect of assessment point, $F(1, 69) = 26.46$, $P < 0.001$, and a marginally significant interaction, $F(3, 69) = 2.34$, $P = 0.09$. Simple effects analysis revealed that participants in the *effort*, *surgery* and *no information* conditions rated Susan as significantly more competent after weight loss than before weight loss; there was no difference for the control condition. At baseline, the *effort* and *no information* conditions significantly differed from the control condition but the *surgery* condition did not. After weight loss, however, no significant difference was found between any of the four conditions.

Warmth. There were no significant main effects or interactions for ratings of warmth.

Discussion

The aim of this study was to determine (1) whether participants' impressions of a previously obese target changed after they learned that the target had lost weight, and (2) whether changes in those impressions differed as a function of weight-loss method. As predicted, participants' perceptions of the obese target at baseline were generally more negative than perceptions of the thin control target, but those perceptions became more positive after participants learned that the target had lost weight. Regardless of the weight-loss method, the previously obese target was rated as eating more healthily and exercising more, and as being more competent and less sloppy, after weight loss than before weight loss. In most cases, ratings of the target after she had lost weight were the same as if she had always been thin. Interestingly, previously obese targets were judged as being even more physically active after they lost weight than if they had been thin from the beginning, perhaps as a result of participants assuming that weight loss is dependent on exercise. Thus, contrary to previous research on attitudes towards obese individuals after weight loss,^{15,16} the results of this study suggest that attitudes towards previously obese individuals can become more positive when those individuals lose weight.

Although our findings indicate that attitudes toward obese individuals who have lost weight are generally more positive, the method through which weight loss is achieved does influence judgments to some extent. Targets who had lost weight through diet and exercise were seen as exercising more frequently than targets who had lost weight through surgery. Furthermore, targets who lost weight through diet and exercise were also seen as less lazy than targets who had lost weight through surgery, and laziness ratings for targets who had lost weight through surgery did not differ from baseline ratings of the target when she was still obese. As the trait lazy is one of the core obesity stereotypes, these results may indicate that previously obese individuals who lose weight through surgery continue, in some respects, to be viewed as an obese person and continue to be associated with common obesity stereotypes. Weight-loss surgery patients may not be able to overcome the obesity stigma as surgery may be perceived as the lazy weight-loss option because of an assumption that it does not require the effort and discipline that losing weight through exercise and dieting does.¹⁷ Thus, despite choosing to undergo weight-loss surgery to reduce weight stigma,²⁰ obese individuals may continue to be viewed as conforming to the obesity stereotype, and hence be considered lazy and lacking willpower.

In addition to examining differences in judgments based on method of weight loss, it is also interesting to examine people's judgments of a target when no information is given about how weight loss is achieved. There are likely many instances in which one may learn about another person's weight loss without knowing how that person achieved the

weight loss. What assumptions do people make in those instances? We found that when no information was given about the reason for weight loss, ratings of the target paralleled those of the targets who had lost weight through diet and exercise. These findings suggest that when no information is provided about the means through which weight is lost, people assume that the individual lost weight through dieting and exercise, and this is despite the fact that surgery is the most effective method of weight loss for obese individuals.^{18,19}

In this study, no difference in judgments of warmth was found among any of the conditions. Although there is some evidence that obese individuals are seen as being friendly and warm,²⁶ these characteristics are not as strongly associated with obesity as are some other characteristics (such as, lazy, sloppy and incompetent). For example, a recent study found that describing an obese person as having high social status resulted in increased ratings of competence and decreased ratings of laziness, but there was no change in ratings of warmth.²⁷ Furthermore, consistent with the findings of this study, Mattingly *et al.*²⁴ found no difference in the likability ratings of individuals who had lost weight through dieting and exercise, who lost weight through surgery or who were always thin. Thus, warmth does not appear to be a core feature of the stereotypes of obese individuals.

Some limitations of the present research should be noted. First, the study used before-and-after photographs of a single female target individual, who was rated as moderately attractive even when she was obese. Thus, future research could examine a broader range of targets (including men) to increase the generalizability of these findings. Second, perceived controllability of body weight was not measured. Some of the key findings that differentiated weight-loss methods related to effort and laziness, which might also be related to the view that body weight is under personal control. Indeed, Mattingly *et al.*²⁴ found that weight loss through diet and exercise was associated with greater perceptions of responsibility for weight loss than did weight loss through surgery. Thus, future research could examine participants' beliefs in the controllability of body weight as a mediator or moderator of attitude change as a function of weight-loss method.

In conclusion, many overweight and obese people are motivated to lose weight as a means of reducing the prevalence of weight stigma.²⁰ The findings of this study indicate that impressions of obese individuals do in fact improve after they have lost weight, but that this might depend on the method of weight loss. Specifically, individuals who lost weight through surgery were seen as being just as lazy as they were before they lost weight, suggesting that at least some aspects of the stigma of obesity lingers after losing weight through surgery. Obese people who lose weight can benefit from reduced weight stigma in addition to the health benefits associated with weight loss, but continued efforts are needed to reduce the stigma associated with obesity surgery.

Conflict of interest

The authors declare no conflict of interest.

References

- 1 Ogden CL, Carroll MD, Curtin LR, McDowell MA, Tabak CJ, Flegal KM. Prevalence of overweight and obesity in the United States, 1999–2004. *JAMA* 2006; **295**: 1549–1555.
- 2 Australian Bureau of Statistics. *National health survey: summary of results, 2007-2008 (Reissue)*. Retrieved from <http://www.abs.gov.au/ausstats/abs@.nsf/mf/4364.0>, 2009.
- 3 Australian Bureau of Statistics. *Smoking, risky drinking and obesity*. Retrieved from <http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4102.0Main+Features30Dec+2009>, 2009.
- 4 Puhl RM, Heuer CA. The stigma of obesity: a review and update. *Obesity* 2009; **17**: 941–964.
- 5 Puhl R, Brownell KD. Bias, discrimination, and obesity. *Obes Res* 2001; **9**: 788–805.
- 6 Crandall CS. Prejudice against fat people: ideology and self-interest. *J Pers Soc Psychol* 1994; **66**: 882–894.
- 7 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.
- 8 Hilbert A, Rief W, Braehler E. Stigmatizing attitudes toward obesity in a representative population-based sample. *Obesity* 2008; **16**: 1529–1534.
- 9 Penny H, Haddock G. Anti-fat prejudice among children: the ‘mere proximity’ effect in 5–10 year olds. *J Exp Soc Psychol* 2007; **43**: 678–683.
- 10 Brown I. Nurses’ attitudes towards adult patients who are obese: Literature review. *J Adv Nurs* 2006; **53**: 221–232.
- 11 Jay M, Kalet A, Ark T, McMacken M, Messito MJ, Richter R *et al*. Physicians’ attitudes about obesity and their associations with competency and specialty: A cross-sectional study. *BMC Health Serv Res* 2009; **9**: 106–117.
- 12 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.
- 13 Goldstein DJ. Beneficial health effects of modest weight loss. *Int J Obes Relat Metab Disord* 1992; **16**: 397–415.
- 14 Oster G, Thompson D, Edelsberg J, Bird AP, Colditz GA. Lifetime health and economic benefits of weight loss among obese persons. *Am J Public Health* 1999; **89**: 1536–1542.
- 15 Geier AB, Schwartz MB, Brownell KD. ‘Before and after’ diet advertisements escalate weight stigma. *Eating Weight Dis* 2003; **8**: 282–288.
- 16 Blaine BE, DiBlasi DM, Connor JM. The effect of weight loss on perceptions of weight controllability: implications for prejudice against overweight people. *J Appl Biobehav Res* 2002; **7**: 44–56.
- 17 Christopher AN, Morgan RD, Marek P, Troisi JD, Jones JR, Reinhart DF. Affluence cues and first impressions: does it matter how the affluence was acquired? *J Econ Psychol* 2005; **26**: 187–200.
- 18 O’Brien PE, Sawyer SM, Laurie C, Brown WA, Skinner S, Veit F *et al*. Laparoscopic adjustable gastric banding in severely obese adolescents: a randomized trial. *JAMA* 2010; **303**: 519–526.
- 19 Shabbir A, Loi TH, Lomanto D, Ti TK, So JBY. Surgical management of obesity: National university hospital experience. *Annals Acad Med Singapore* 2009; **38**: 882–890.
- 20 Peace K, Dyne J, Russell G, Stewart R. Psychological effects of gastric restriction surgery for morbid obesity. *New Zeal Med J* 1989; **102**: 76–78.
- 21 Kral JG, Sjöström LV, Sullivan MBE. Assessment of quality of life before and after surgery for severe obesity. *Am J Clin Nutr* 1992; **55**: 611S–614S.
- 22 Rand CW, MacGregor AMC. Morbidly obese patients’ perceptions of social discrimination before and after surgery for obesity. *South Med J* 1990; **83**: 1390–1395.
- 23 Vallis TM, Butler GS, Perey B, van Zanten SJO, MacDonald AS, Konok G. The role of psychological functioning in morbid obesity and its treatment with gastroplasty. *Obes Surgery* 2001; **11**: 716–725.
- 24 Mattingly BA, Stambush MA, Hill AE. Shedding the pounds but not the stigma: negative attributions as a function of a target’s method of weight loss. *J Appl Biobehav Res* 2009; **14**: 128–144.
- 25 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.
- 26 Tiggemann M, Rothblum ED. Gender differences in social consequences of perceived overweight in the United States and Australia. *Sex Roles* 1988; **18**: 75–86.
- 27 Vartanian LR, Silverstein KM. Obesity as a status cue: perceived social status and the stereotypes of obese individuals (submitted for publication).