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Investigating lay beliefs regarding the effect of weight loss on health

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ABSTRACT

Objective: Individuals with obesity are often recommended weight loss for their health; however, the amount of weight loss that is recommended varies. Lay people's beliefs about weight loss could influence the types of behaviours they view as necessary for people with obesity. The present study explored lay beliefs regarding the health benefits of varying degrees of weight loss.

Design: Participants (379 community members and 235 students) read information about an obese target who lost varying amounts of weight (none vs. modest vs. substantial) following behaviour changes.

Main outcome: Participants evaluated the target's health and recommended health-related behaviours to the target.

Results: The substantial weight-loss target, but not the modest weight-loss target, was perceived as being healthier than the no weight-loss target. There were no differences in behaviour recommendations made to the no weight-loss and modest weight-loss targets, with most participants recommending further weight loss to both targets.

Conclusions: Lay people appear to view substantial, but not modest, weight loss as beneficial to health, and they recommend further, more unrealistic amounts of weight loss to obese individuals who have already achieved modest weight loss. A failure to recognise the health benefits of modest weight loss may contribute to unrealistic weight loss goals.

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Body weight; weight loss; health; lay beliefs; obesity

Most health guidelines for the management of obesity include 'weight loss' as a recommendation (e.g. CDC, 2018; NHMRC, 2013b; NICE, 2014); however, there is large variation in the amount of weight loss that is portrayed as being necessary to improve the health of individuals who are obese. Some guidelines state that all individuals should aim to achieve and maintain a normal weight (CDC, 2018; NHMRC, 2013a), which would require a substantial and often unrealistic amount of weight loss for an individual with obesity. Other guidelines emphasise that 'modest' weight loss (i.e. a 5–10% reduction in weight) is a more realistic goal that can confer important health

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benefits (NHMRC, 2013b; NICE, 2014; NIH, 1998).¹ Importantly, whether or not members of the public believe that modest weight loss is sufficient to improve health is likely to impact the kinds of health-related goals and behaviours that they believe are necessary for people with obesity. Thus, the current article explored lay beliefs about the impact of varying degrees of weight loss on health. Before reviewing previous research regarding lay beliefs, we first review the available evidence regarding the actual plausibility and health impact of weight loss.

For individuals with obesity, achieving a normal weight would require a substantial amount of weight loss. For example, a woman of average height (162 cm)² whose weight fell at the lower end of the obese range (84 kg; body mass index [BMI] = 32) would need to lose 19 kg simply to be at the upper end of the normal-weight range (65 kg; BMI = 24.8). However, research consistently finds that individuals with obesity typically only lose modest amounts of weight (~3–8 kg) after 6 months of lifestyle changes, and that most individuals subsequently regain at least some of that weight within 6–12 months (Franz et al., 2007; Hartmann-Boyce et al., 2014). Outside of clinical trials, the annual probability of a woman with obesity achieving a normal weight is 1 in 124, whereas the probability of her achieving modest weight loss is 1 in 10 (Fildes et al., 2015). Thus, although the available evidence suggests that even achieving and maintaining modest weight loss is challenging, it is certainly the case that modest weight loss is far more achievable for individuals with obesity than is becoming a normal weight.

The available evidence regarding the effect of weight loss on various health outcomes is mixed. Two reviews have found no benefit of weight loss on all-cause mortality (Harrington et al., 2009; LeBlanc et al., 2018), and weight-loss interventions do not reduce the incidence of cardiovascular events or improve health-related quality of life (LeBlanc et al., 2018). Moreover, weight-loss dieting appears to have minimal health benefits (Mann et al., 2007), and the few benefits that are observed following dieting are not correlated with the amount of weight lost (Tomiya et al., 2013). On the other hand, behavioural interventions that result in modest weight loss are associated with a decreased risk of developing diabetes (LeBlanc et al., 2018), and this reduction in diabetes incidence is observed even after adjusting for changes in diet and physical activity (Hamman et al., 2006), suggesting that the weight loss per se may be beneficial. Moreover, modest weight loss is associated with improvements in cardiovascular disease and diabetes risk factors, and these reductions occur even for individuals whose weight remains in the obese range (Van Gaal et al., 1997; Vidal, 2002; Wing et al., 2011). Therefore, for individuals who *want* to lose weight or who have a family history of diabetes, modest weight loss may be a realistic and sensible health goal.

Lay beliefs about weight loss

Although individuals attempt to lose weight for a variety of reasons, including altering their mood, fitness, and appearance, most individuals who are trying to lose weight report that a concern for health is one of their primary motivations (Garip & Yardley, 2011; Hankey et al., 2002; O'Brien et al., 2007). Understanding people's beliefs about

the impact of weight loss on health is important given the possible impact of such beliefs on people's engagement with health-related behaviours. For example, some individuals with obesity view the amount of weight that they would need to lose to be 'healthy' as beyond their capacity and, hence, feel discouraged from even trying to change their behaviours (Lewis et al., 2010). Moreover, if only substantial levels of weight loss are viewed as being beneficial to health, then this might contribute to the high rates of unrealistic weight loss goals that are observed amongst many individuals with obesity (Pétre et al., 2018), which are in turn associated with greater attrition from lifestyle interventions (Dalle Grave et al., 2005; Sasdelli et al., 2018; Teixeira et al., 2004; Thomas et al., 2015). Therefore, there may be an important relationship between the extent to which weight loss is viewed as necessary for health and people's desire to engage with various health-related behaviours.









When explicitly asked, most lay people agree that losing weight would improve the health of individuals with obesity (Kwan, 2009, 2012; Riddell & Inman, 2007; Timperio et al., 2000). However, it is not clear from previous studies what *amount* of weight loss people perceive as being necessary to improve health. For example, do lay people recognise the health benefits that are associated with modest weight loss, or do they believe that a more substantial amount of weight loss is required to improve the health of an individual with obesity? Previous studies have found that individuals with obesity often perceive modest weight loss as being 'disappointing', with their 'ideal' amount of weight loss being far more substantial (i.e. 24–36% weight loss; Daigle et al., 2019; Foster et al., 1997; Pétre et al., 2018). Given that many individuals want to lose weight to improve their health (Garip & Yardley, 2011), one reason why modest weight loss may be viewed as disappointing is that individuals do not believe that modest weight loss would result in health benefits. That is, although people may agree with the broad sentiment that weight loss improves the health of individuals with obesity (e.g. Riddell & Inman, 2007), it may be the case that people do not view *modest* weight loss as sufficiently impactful to improve health.

The present study

The primary aim of the current study was to examine the impact of varying degrees of weight loss on perceptions of a target person's health. To achieve this aim, we developed four 'before-and-after' vignettes in which a female target was initially described as engaging in an unhealthy lifestyle (Part A), and then was subsequently described as having adopted a healthier lifestyle (Part B). In Part A, all targets were described as engaging in the same unhealthy lifestyles and the targets differed only in terms of their starting weight (obese vs. normal weight). In Part B, all targets were described as having adopted the same healthy lifestyle, and the targets differed only in terms of the amount of weight lost (no loss vs. modest loss vs. substantial loss). See [Table 1](#) for a summary of the study design.

Based on previous research suggesting that substantial weight loss is likely to be perceived as beneficial to health (e.g. Kwan, 2012), we hypothesise that the substantial weight-loss target will be perceived as significantly healthier than will the no weight-loss target (H1). In contrast, we anticipate that there will be little or no difference in

Table 1. Study design outlining four pairs of vignettes as a function of target weight and degree of weight loss following a healthy lifestyle change.
 Source: Springer Nature.

	Condition			
	No weight-loss target	Modest weight-loss target	Substantial weight-loss target	Normal-weight control target
Part A: Target described as having engaged in unhealthy diet and exercise behaviours across adult life	Obese 	Obese 	Obese 	Normal weight 
Part B: Target described as having engaged in healthy diet and exercise behaviours for the previous year	No weight change, remains obese 	Modest loss (5 kg), remains obese 	Substantial loss (23 kg), becomes normal weight 	No weight change, remains normal weight 

perceived health between the no weight-loss target and the modest weight-loss target (H2). Although we expect that substantial weight loss will be seen as beneficial to health, it is not clear whether substantial weight loss will completely negate the negative perceived health impact of the target having previously been obese. One previous study found that the same normal-weight target was perceived as being *less* healthy when she was described as having lost 25 lbs compared to when no information was provided about the target's former weight (Mattingly et al., 2010), suggesting that there may be a perceived negative health impact of the target having previously been overweight. Based on this finding, we hypothesise that the substantial weight-loss target will be perceived as less healthy than will the normal-weight control target (H3).

The second aim of the current study was to investigate the impact of weight loss on the types of behaviour recommendations made to each target for the sake of her health. For example, people may believe that an individual who has not lost any weight following a lifestyle change needs to engage in more behaviours (e.g. exercise, dieting) for her health than does someone who has already lost a substantial amount of weight. Moreover, if modest weight loss is *not* viewed as sufficient for improving health, then we might expect that people would recommend further weight loss (and behaviours directed towards weight loss) to an individual who has only lost a modest amount of weight. Therefore, we hypothesise that the no weight-loss target will be recommended to engage in more health-related behaviours than will the substantial weight-loss target (H4), whereas there will be little or no differences in the behaviour recommendations made to the no weight-loss target and to the modest weight-loss target (H5). We might also tentatively expect that lay people will believe that individuals who were previously obese should continue to be conscious of their weight and, hence, should engage in more weight-focused behaviours (e.g. counting calories) than should their stable normal-weight counterparts. Thus, we anticipate that the substantial weight-loss target will be recommended to engage in more weight-focused behaviours than will the normal-weight control target (H6).

Method

Two separate samples were included in this study to increase the generalisability of our results: The first sample consisted of community members based in the United States and a second convenience sample consisted of undergraduate students from a large Australian university. The university's ethics committee approved both studies, and all participants provided informed consent before completing the survey.

Participants

Community sample

Participants from the community sample were based in the United States and were recruited through Amazon's Mechanical Turk (MTurk). Participants completed the study in exchange for 1.50 USD. Previous research has found a large effect ($\eta_p^2 = .27$) when examining the effect of a target's weight on perceived health (Black et al., 2018). Given that this study was exploring the effect of weight *loss* on perceptions of health,

the study was powered more conservatively to detect a medium effect size. A minimum sample size of 58 participants per condition was determined to be adequate for detecting a medium effect ($f = 0.25$) with 90% power in a between-group design with four groups (G*Power; Faul et al., 2007). From the initial sample of 443 individuals, participants were excluded from analysis if they responded incorrectly to the attention check ($n = 7$) or if they indicated that they did not read the target's profile carefully ($n = 57$). The final sample consisted of 379 adults (58% men; 67% Caucasian) with a mean age of 36.67 (SD = 10.75; range = 20–73) and a mean BMI (based on self-reported height and weight) of 25.89 (SD = 8.00; range = 12.46–78.48).

Student sample

A total of 259 undergraduates at a large Australian university completed the study in exchange for course credit. Participants were excluded from analysis if they were under 18 years of age ($n = 1$), indicated that they did not read the target's profile carefully ($n = 17$), reported that the target's health decreased substantially following the described lifestyle changes ($n = 2$), or responded incorrectly to the attention check ($n = 4$). The final sample consisted of 235 adults (68% women; 57% Asian and 30% Caucasian) with a mean age of 19.49 (SD = 3.24; range = 18–54) and a mean BMI (based on self-reported height and weight) of 22.36 (SD = 3.95; range = 15.43–44.79).

Materials

Four pairs of vignettes were created in order to manipulate information about a female target's lifestyle and weight loss. In Part A of the vignette, three of the four conditions depicted an obese woman (the same image was shown in all three conditions) who was described as having engaged in unhealthy diet and exercise behaviours across her adult life. A fourth control condition depicted a normal weight target who was similarly described as having engaged in unhealthy behaviours (the 'normal-weight control target'). Images were taken from the Body Size Guides Scale (Harris et al., 2008), and portrayed the target as either normal weight or obese (images C and G, respectively). All targets were described as being a 33-year-old project manager who did not smoke, rarely drank alcohol and had no major medical issues. Thus, the only difference between conditions in Part A was the starting weight of the target (normal weight vs. obese).

In Part B of the vignette, all targets were described as having undergone healthy lifestyle changes with the support of a doctor, including increasing engagement with aerobic and strength-based exercises, and making positive dietary changes (e.g. increasing consumption of fruits, vegetables, whole grains, nuts and low-fat dairy, and decreasing consumption of discretionary foods). The described healthy behaviours were in line with Australian dietary and physical activity guidelines (Department of Health, 2014; NHMRC, 2013a). Across the three conditions that had previously depicted an obese woman, the degree of weight loss that resulted from the target's lifestyle changes was manipulated, with the targets being described as either having: (1) maintained a stable weight (the 'no weight-loss target'), (2) lost 5 kg (the 'modest weight-loss target') or (3) lost 23 kg (the 'substantial weight-loss target'). Participants were

also shown updated images of the targets that reflected the described amount of weight loss (Images G, F and C, respectively). The normal-weight control target was described as having maintained a stable weight, and the same picture of the target from Part A was used (Image C).

Measures

Perceived health

Participants were asked to estimate the target's overall health using a slider ranging from 0 to 100. The slider did not include discrete labels; instead, participants were informed that higher values indicated greater perceived health.

Recommended health behaviours

Participants viewed a list of general health behaviours that the target already engaged in to some extent (9 items: 'aerobic exercise', 'strength-based exercise', 'sedentary behaviours', 'incidental exercise' and eating 'fruits', 'vegetables', 'whole grains', 'discretionary foods' and 'low-fat dairy'), and were asked whether they would recommend that the target reduce, maintain, or increase her current level of engagement with those behaviours ($-2 = \text{reduce significantly}$, $0 = \text{maintain current engagement}$, $2 = \text{increase significantly}$). The phrasing of the items was influenced by the Australian dietary and physical activity guidelines (Department of Health, 2014; NHMRC, 2013a). After reverse scoring the items relating to engagement in sedentary behaviours and consumption of discretionary foods, a total score was created by averaging all items ($\alpha_{\text{community}} = 0.72$; $\alpha_{\text{student}} = 0.71$). A positive total score indicates that participants believe that the target should further *increase* her level of engagement with general health behaviours.

Participants then viewed a list of novel behaviours and were asked to rate the extent to which they agreed that the target should adopt these behaviours in order to improve her health ($-3 = \text{strongly disagree}$, $3 = \text{strongly agree}$). This list of behaviours included both typical weight-focused behaviours (5 items: 'count calories', 'go on a diet', 'eat less fat', 'cut down on carbohydrates', and 'reduce portion sizes') and extreme weight-loss behaviours (4 items: 'skip meals', 'take diet pills', 'purge/vomit food', and 'use laxatives or diuretics'). These items were adapted from previous research that has differentiated 'healthy' and 'unhealthy' weight-control strategies (e.g. French et al., 1995; Neumark-Sztainer et al., 2012; Roy & Gauvin, 2010). Total scores for weight-focused behaviours ($\alpha_{\text{community}} = 0.75$; $\alpha_{\text{student}} = 0.76$) and extreme weight-loss behaviours ($\alpha_{\text{community}} = 0.95$; $\alpha_{\text{student}} = 0.60$) were created by averaging the items in each category. A positive total score on either of these scales indicates that participants agree that the target should engage in these behaviours for her health.

Recommended weight change

Participants were asked to select whether the target should try to 'lose weight', 'maintain her current weight', or 'gain weight' for her health. Participants who indicated that the target should lose weight for her health were subsequently asked to estimate how much weight they believed that the target needed to lose in order to

improve her health (in pounds for the community sample, and in kilograms for the student sample).

Possible confounding variables

Although all targets were described as engaging in the same healthy behaviours in Part B, participants may view greater levels of weight loss as indicating that the target's lifestyle was healthier. Therefore, participants were asked to rate the extent to which they viewed the target's lifestyle as healthy, how strict they thought the target was in adhering to her lifestyle, and how much effort they thought the target put into modifying her lifestyle (1 = *not at all*, 5 = *a great deal*). Each of these individual items was examined as a potential covariate.

Procedure

Participants from both samples completed the study online and were informed that they would be asked to read information about an individual and then answer questions about the individual's health. Participants were randomly allocated to one of the four vignettes described above. Participants were asked to estimate the target's overall health after reading the information described in Part A, and were again asked to estimate the target's health after reading the information described in Part B. Next, participants were asked to make behaviour recommendations to the target, and to assess whether the target needed to change her weight for her health. Participants were subsequently provided with a reminder of the information described in Part B before being asked to answer the items about possible confounding variables. Finally, participants were asked to report their age, sex, level of education, ethnicity, and height and weight (which were used to calculate their BMI).

Statistical analyses

A one-way ANOVA with four, planned contrasts was used to compare the perceived health of the targets after Part A. Specifically, the three obese targets were compared against one another to ensure that there were no significant differences in perceived health, and the normal-weight control target was compared against the average of the obese targets to investigate the influence of starting weight on perceived health. A Bonferroni-corrected alpha of $p = 0.013$ ($0.05/4$) was used. One-way ANOVAs with three Bonferroni-corrected contrasts (adjusted $p = 0.017$) were then used to assess the impact of weight loss described in Part B on the perceived health of the target and on the behaviour recommendations that were made to each target. In line with H1–H6, the contrasts of interest were comparing: (1) the substantial weight-loss target against the no weight-loss target, (2) the modest weight-loss target against the no weight-loss target, and (3) the substantial weight-loss target against the normal-weight control target. In terms of the specific recommendation that the target lose weight, a chi-square analysis was used to determine the proportion of participants who recommended weight loss to each target.

Of note, although participant BMI was not significantly different across conditions in either the community sample, $F_{(3,375)} = 0.40$, $p = 0.750$, or the student sample, $F_{(3,231)} = 0.37$, $p = 0.775$, participant BMI did have a marginally significant negative correlation with the perceived health of the target in the student sample ($r = -0.13$, $p = 0.051$). Importantly, however, there were no differences in the main analyses when entering participant BMI as a covariate and, hence, the analyses reported below do not include participant BMI as a covariate. In addition, we used two-way ANOVAs to examine whether the effect of condition on the outcome variables differed as a function of participant weight status (normal weight vs. overweight/obese), and found no evidence of any interaction effects in the community sample, $ps > 0.160$ (there was an insufficient number of overweight or obese participants in the student sample to reliably test for interactions). Therefore, the results described below do not appear to differ as a function of participant BMI or weight status.

Results

Possible confounding variables

Although all participants received identical information about the target's lifestyle, there were significant between-group differences in the perceived healthiness of the target's lifestyle (Community: $F_{(3,375)} = 6.29$, $p < 0.001$, $\eta_p^2 = 0.05$; Student: $F_{(3,231)} = 2.59$, $p = 0.053$, $\eta_p^2 = 0.03$), the perceived adherence of the target to the lifestyle (Community: $F_{(3,375)} = 6.11$, $p < 0.001$, $\eta_p^2 = 0.05$; Student: $F_{(3,231)} = 2.95$, $p = 0.033$, $\eta_p^2 = 0.04$), and the perceived effort that the target put into her lifestyle (Community: $F_{(3,375)} = 5.94$, $p = 0.001$, $\eta_p^2 = 0.05$; Student: $F_{(3,231)} = 3.77$, $p = 0.011$, $\eta_p^2 = 0.05$). Importantly, no differences in the main analyses emerged when entering the confound variables as covariates. Therefore, the observed differences between groups in terms of perceived health and behaviour recommendations (described below) are not likely to be accounted for by any differences in the extent to which participants believed that each of the targets were engaging in a healthy lifestyle.

Perceived health prior to weight loss (part A)

See Table 2 for group means and standard deviations. As expected, in both the community and student samples there were no significant differences in perceived health between any of the three identical obese targets, $ps > 0.327$. Moreover, the normal-weight control target was perceived as being significantly healthier than was the obese target in both the community sample, $t_{(1, 375)} = 4.12$, $p = 0.043$, $\eta_p^2 = 0.01$, and the student sample, $F_{(1, 231)} = 6.79$, $p = 0.010$, $\eta_p^2 = 0.03$.

Perceived health following weight loss (part B)

Within the community sample, there was a significant main effect of condition on perceptions of the target's health $F_{(3,375)} = 8.73$, $p < 0.001$, $\eta_p^2 = 0.07$. In support of H1, the substantial weight-loss target was perceived as being significantly healthier than was the no weight-loss target, $F_{(1,375)} = 21.21$, $p < 0.001$, $\eta_p^2 = 0.05$. In line with H2,

Table 2. Group means (SDs) for perceived health and recommended behaviours as a function of the purported weight and weight history of the target

Dependent variables		Condition			
		No weight-loss target	Modest weight-loss target	Substantial weight-loss target	Normal-weight control target
Community	Perceived Health (Part A)	53.58 (20.19)	51.67 (20.72)	53.14 (19.32)	57.61 (18.76)
	Perceived Health (Part B)	70.49 (16.13)	73.03 (15.82)	80.41 (13.72)	77.83 (13.25)
	General Health Behaviours	0.72 (0.50)	0.73 (0.58)	0.65 (0.50)	0.68 (0.46)
	Weight-Focused Behaviours	1.07 (1.19)	0.74 (1.17)	0.51 (1.39)	0.54 (1.33)
	Extreme Weight Behaviours	-1.48 (1.92)	-1.64 (1.91)	-1.77 (1.93)	-1.76 (1.79)
Student	Weight-Loss Recommendations	75% (10.71 kg)	72% (8.67 kg)	30% (3.53 kg)	45% (3.98 kg)
	Perceived Health (Part A)	40.97 (18.44)	40.72 (14.78)	37.93 (15.69)	46.30 (17.04)
	Perceived Health (Part B)	70.46 (13.77)	70.19 (12.50)	78.29 (10.85)	77.46 (11.60)
	General Health Behaviours	0.82 (0.40)	0.82 (0.38)	0.73 (0.37)	0.72 (0.36)
	Weight-Focused Behaviours	0.29 (1.15)	-0.19 (1.17)	-0.41 (1.32)	-0.51 (1.23)
	Extreme Weight Behaviours	-2.52 (0.72)	-2.78 (0.31)	-2.61 (0.54)	-2.73 (0.38)
	Weight-Loss Recommendations	61% (5.46 kg)	73% (5.88 kg)	32% (2.43 kg)	31% (2.56 kg)

For weight-loss recommendations, the percentages reflect the proportion of participants who indicated that the target should lose weight, and the bracketed numbers reflect the mean weight-loss recommended when coding participants who reported that the target should 'maintain' her current weight as 0 kg recommended weight loss.

the modest weight-loss target was not perceived as being significantly healthier than was the no weight-loss target, $F_{(1,375)} = 1.42$, $p = 0.235$. Contrary to H3, the substantial weight-loss target was not perceived as being significantly less healthy than was the normal-weight control target, $F_{(1,375)} = 1.42$, $p = 0.234$. These results were replicated in the student sample: There was a significant main effect of condition, $F_{(3,231)} = 7.47$, $p < 0.001$, $\eta_p^2 = 0.09$, a significant difference between the substantial weight-loss target and the no weight-loss target, $F_{(1,231)} = 11.75$, $p = 0.001$, $\eta_p^2 = 0.05$, but no significant difference between the modest weight-loss target and the no weight-loss target, $F_{(1,231)} = 0.01$, $p = 0.904$, and no significant difference between the substantial weight-loss target and the normal-weight control target, $F_{(1,231)} = 0.13$, $p = 0.715$.

Behaviour change recommendations

General health behaviours

There were no significant main effects of condition on general health behaviour recommendations in either the community, $F_{(3, 375)} = 0.53$, $p = 0.665$, or the student sample, $F_{(3,231)} = 1.36$, $p = 0.256$. Further, none of the three planned contrasts were significant in either the community, $t_{(1, 375)} < |0.94|$, $ps > 0.348$, or the student sample, $t_{(1, 231)} < 1.31$, $ps > 0.191$.

Weight-focused behaviours

Within the community sample, there was a significant main effect of condition on weight-focused behaviour recommendations, $F_{(3,374)} = 3.77$, $p = 0.011$, $\eta_p^2 = 0.03$. In line with H4, significantly fewer weight-focused behaviours were recommended to the substantial weight-loss target than were recommended to the no weight-loss target, $F_{(1,374)} = 8.93$, $p = 0.003$, $\eta_p^2 = 0.02$. In support of H5, there was no significant difference in the extent to which weight-focused behaviours were recommended to the no weight-loss target and to the modest weight-loss target, $F_{(1,374)} = 3.14$, $p = 0.077$.

Contrary to H6, there was no significant difference between the substantial weight-loss target and the normal-weight control target in terms of weight-focused behaviour recommendations, $F_{(1,374)} = 0.03$, $p = 0.869$. These results were replicated in the student sample: There was a significant main effect of condition, $F_{(3,231)} = 5.06$, $p = 0.002$, $\eta_p^2 = 0.06$, a significant difference between the substantial weight-loss target and the no weight-loss target, $F_{(1,231)} = 9.56$, $p = 0.002$, $\eta_p^2 = 0.04$, but no significant difference between the modest weight-loss target and the no weight-loss target (once accounting for multiple comparisons), $F_{(1,231)} = 4.61$, $p = 0.033$, and no significant difference between the substantial weight-loss target and the normal-weight control target, $F_{(1,231)} = 0.19$, $p = 0.667$.

Extreme weight-loss behaviours

In the community sample, there was no significant main effect of condition on extreme weight-loss behaviour recommendations, $F_{(3, 375)} = 0.49$, $p = 0.687$, with participants generally disagreeing that the target should engage in extreme behaviours. Further, none of the three planned contrasts were significant, $ts_{(1, 375)} < |1.06|$, $ps > 0.288$. Participants in the student sample also tended to disagree that the target should engage in extreme weight-loss behaviours; however, there was a significant main effect of condition on extreme behaviour recommendations, $F_{(3,230)} = 3.11$, $p = 0.027$, $\eta_p^2 = 0.04$. Participants who viewed the modest weight-loss target more strongly disagreed that the target should engage in extreme behaviours than did participants who viewed the no weight-loss target, $F_{(1,230)} = 7.74$, $p = 0.006$, $\eta_p^2 = 0.03$. There were no differences in extreme weight-loss behaviour recommendations between the no weight-loss target and the substantial weight-loss target, $F_{(1,230)} = 0.93$, $p = 0.337$, or between the substantial weight-loss target and the normal-weight control target, $F_{(1,230)} = 1.48$, $p = 0.226$.

Recommendation to lose weight

See Table 2 for the percentage of participants who recommended weight loss to each target, as well as the quantity of weight loss that was recommended to each target. There was a moderate, statistically significant association between condition and weight-loss recommendations in both the community, $\chi^2_{(6)} = 64.35$, $p < 0.001$, $\phi = 0.41$, and student samples, $\chi^2_{(3)} = 31.00$, $p < 0.001$, $\phi = 0.36$. Across both samples, significantly fewer participants recommended weight loss to the substantial weight-loss target than they did to the no weight-loss target. There were no significant differences in the proportion of participants who recommended weight loss to the no weight-loss target and to the modest weight-loss target, or to the substantial weight-loss target and to the normal-weight control target.

Discussion

The primary purpose of the current study was to determine the impact of weight loss on perceptions of an individual's health. To achieve this aim, we created four vignettes depicting women who had lost differing amounts of weight following the same positive lifestyle changes. Consistent with previous research (e.g. Black et al., 2018), the

present study found that the obese target was perceived as being less healthy than was the normal weight target when matched for the same level of engagement with unhealthy behaviours (in Part A). These results provide further evidence that lay people view obesity per se as being detrimental to one's health.

After learning about the target's positive lifestyle changes (in Part B), participants perceived the target who lost a substantial amount of weight as being significantly healthier than they did the target who lost no weight. Moreover, there was no difference in the perceived health of the substantial weight-loss target and the target who had always maintained a stable normal weight, suggesting that not only is substantial weight loss perceived as being beneficial to health, but there appears to be no perceived negative health impact of having previously been obese. Given that we did not observe a perceived residual health impact of obesity, it may be the case that Mattingly et al.'s (2010) findings were not accounted for by the target's former weight, but by other aspects of the weight-loss vignette, such as the method of weight-loss that was described (i.e. going on a 'strict diet') or the description of target's mental health (e.g. she was described as being 'dissatisfied' with her appearance and 'desperate' to lose weight). In any case, it is difficult to assess whether lay people are correct in believing that there is no residual health impact of having been obese because there are so few individuals who have been able to transition from being obese to a normal weight and then maintain this lower weight in the long-term (Fildes et al., 2015). Nonetheless, that fact that lay people perceive substantial weight loss as being so beneficial to health may contribute to the high rates of unrealistic weight-loss goals amongst the general public (Daigle et al., 2019).

In contrast to substantial weight loss, modest weight loss did not appear to improve perceptions of the target's health. Indeed, there was no significant difference in perceived health between the no weight-loss target and the modest weight-loss target. Thus, despite evidence that modest weight loss is sufficient to benefit health (e.g. Hamman et al., 2006), the lay public do not seem to recognise the health benefits associated with modest weight loss. Given that all targets were matched in terms of their level of engagement with healthy behaviours (and that the results hold if we control for differences in perceptions of the target's lifestyle), the current results suggest that lay people view substantial weight loss, but not modest weight loss, as benefiting the health of individuals with obesity over and above the perceived health benefits of behaviour changes alone. In light of these findings, we can speculate that the participants in previous studies who reported believing that weight loss would improve the health of individuals with obesity (e.g. Kwan, 2012; Riddell & Inman, 2007) were envisioning substantial, rather than modest, levels of weight loss.

Failing to see modest weight loss as beneficial to health may also contribute to the perception that many people have that modest weight loss would be 'disappointing' (e.g. Pétré et al., 2018). For many individuals with obesity, modest weight loss would mean remaining in the obese range and, hence, would mean continuing to experience social stigma based on their weight (Puhl & Heuer, 2009). In addition, modest weight loss is unlikely to create a striking visual difference in the appearance of someone with obesity, meaning that individuals who pursue weight loss for aesthetic reasons are unlikely to be satisfied with modest weight loss (O'Brien et al., 2007). Therefore, if

individuals with obesity do not even view modest weight loss as conferring health benefits, then they may see little reason to view modest weight loss as a desirable outcome, leaving them instead to pursue more substantial (and more unrealistic) weight loss goals. Similarly, if individuals in the normal weight range do not believe that modest weight loss is sufficient to improve health, then they may encourage their friends or family members with obesity to aim for unrealistic levels of weight loss. Given that unrealistic weight loss goals contribute to discouragement with exercise and attrition from lifestyle programmes (Dalle Grave et al., 2012; Thomas et al., 2015), it may be counterproductive in terms of improving health for clinical health guidelines (e.g. NHMRC, 2013a) to convey that individuals with obesity must achieve and maintain a normal weight for their health.

If the lay public do not perceive modest weight loss as being beneficial to health, *and* this perception is contributing to unrealistic and unhelpful weight loss goals, then it is worth considering whether public health campaigns should more explicitly encourage modest weight loss. Two small-scale studies have explored the potential benefits of promoting more realistic weight loss goals amongst treatment-seeking women with obesity (Ames et al., 2005; Foster et al., 2004). Both studies found that encouraging modest weight loss goals had little effect on the amount of weight that participants lost when compared to standard treatment, but that participants in the modest weight loss group had greater improvements in self-esteem and body image (Ames et al., 2005; Foster et al., 2004). Therefore, there is some preliminary evidence to suggest that promoting modest weight loss may have important psychological benefits for individuals with obesity in addition to the physical health benefits that may occur as a result of modest weight loss (Vidal, 2002).

The second aim of the current study was to examine the effect of weight loss on the types of behaviours that were recommended to each target. As expected, significantly fewer weight-focused behaviours were recommended to the substantial weight-loss target than were recommended to the no weight-loss target, which may reflect the fact that the substantial weight-loss target was already viewed as having lost sufficient weight to improve her health. Contrary to our hypotheses, however, there were no differences in the behaviour recommendations made to the substantial weight-loss target and to the normal-weight control target. Interestingly, research suggests that the small proportion of individuals who have been able to sustain a large amount of weight loss tend to engage in an hour of physical activity each day and continue to eat a low-calorie diet (Hill et al., 2005), which are more extreme behaviours than those typically recommended to normal weight individuals for maintaining their weight and health (Department of Health, 2014; NHMRC, 2013a). Thus, the fact that there were no differences in the current study in the behaviour recommendations made to a formerly obese target and to an always normal-weight target might suggest that lay people may actually be underestimating the significant behaviour changes that are involved in long-term weight loss.

The current study found no difference in the extent to which weight-focused behaviours were recommended to the no weight-loss target and to the modest weight-loss target, and the majority of participants recommended that both the no weight-loss target and the modest weight-loss target lose more weight (~5–11 kg) for

their health. When considering that the modest weight-loss target was described as having already lost 5 kg and the average weight loss that is produced by lifestyle interventions is ~ 3 –8 kg (e.g. Franz et al., 2007), the additional weight loss that participants recommended to the modest weight-loss target is fairly unrealistic. Moreover, participants generally agreed that both the no weight-loss target and the modest weight-loss target should engage in more weight-focused behaviours (e.g. dieting) for her health. Given that dieting does not appear to be associated with improvements in health (Mann et al., 2007; Tomiyama et al., 2013), and may actually be associated with *increases* in weight over time (Neumark-Sztainer et al., 2012), the recommendations made by participants in the current study do not necessarily align with what is currently known about means of improving the health of individuals with obesity. Overall, the present results suggest that lay people do not view modest weight loss as beneficial to health and, potentially as a result of this fact, continue to recommend weight loss and other weight-focused behaviours to individuals who have already achieved modest weight loss.

Limitations and future directions

One potential limitation of the current study was that substantial weight-loss target both lost a substantial amount of weight *and* her final weight fell within the normal-weight range. Therefore, although the substantial weight-loss vignette did accurately reflect both the public health recommendation that individuals aim to ‘achieve and maintain a normal weight’ (NHMRC, 2013a), it is difficult to disentangle the extent to which the perceived improvements in the substantial weight-loss target’s health were due to her weight loss or due to her final weight status. Future research should vary the amount of weight loss and the final weight of the target in order to understand the unique effect of weight loss on perceptions of health.

Due to a researcher oversight, another potential limitation of the present study was that participants in the community sample were based in the United States, which uses imperial measurements, and the vignettes described the target’s weight loss in metric units. Therefore, it is possible that the weight loss descriptions (i.e. the target ‘lost 5 kg’) were not meaningful to American participants, and that this factor contributed to modest weight loss not being viewed as beneficial to health. However, given that the Australian student sample also did not recognise the health benefits associated with modest weight loss, it is unlikely that unfamiliarity with the units of measurement had a major impact on the current results.

Previous studies that have explored doctors’ beliefs about modest weight loss have simply asked doctors whether they agree or disagree that modest weight loss can improve health outcomes, and such studies consistently find that the vast majority of doctors ‘agree’ (Bocquier et al., 2005; Campbell et al., 2000). In contrast, the current study used vignettes that were intended to portray an ecologically valid representation of modest weight loss (i.e. a description of the number of kilograms lost accompanied by a photograph of the target after losing weight). Given the difference in methods used between studies, it is possible that doctors may not perceive modest weight loss as being beneficial for health when presented with an actual patient who

has only lost a few kilograms. Conversely, it is possible that lay people would agree that modest weight loss is beneficial to health if explicitly asked. Future research could utilise both survey and vignette methodologies to better understand if and to what extent different populations view modest weight loss as beneficial to health.

Conclusion

Public health messages regularly present weight loss as being synonymous with improved health for individuals with obesity. The current study found that lay people have, in part, internalised this message, such that they perceived substantial weight loss as benefitting the health of an obese target over and above changes to the target's diet and exercise behaviours. However, participants did not recognise the potential health benefits associated with modest levels of weight loss, which may explain why the majority of participants recommended further (and more unrealistic) amounts of weight loss to the target who had already lost a modest amount of weight. Future public health discourse may benefit from a shift towards promoting more modest (and realistic) levels of weight loss, or from encouraging all individuals to pursue healthy dietary and exercise habits independent of the effect of these behaviours on weight.

Notes

1. Although the NHMRC guideline states that health benefits can increase with further weight loss, the guidelines acknowledge that achieving a normal weight is an unrealistic goal and, hence, emphasise that people with obesity be informed of the benefits of modest weight loss (NHMRC, 2013b).
2. Based on the average height of Australian women, sourced from the Australian Bureau of Statistics (<https://www.abs.gov.au/ausstats/abs@.nsf/Lookup/4338.0main+features212011-13>).

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Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

References

- Ames, G. E., Perri, M. G., Fox, L. D., Fallon, E. A., De Braganza, N., Murawski, M. E., Pafumi, L., & Hausenblas, H. A. (2005). Changing weight-loss expectations: A randomized pilot study. *Eating Behaviors*, 6(3), 259–269. <https://doi.org/10.1016/j.eatbeh.2005.01.003>

- Black, C., Vartanian, L. R., & Faasse, K. (2018). An experimental test of the effects of a target person's body weight and engagement with health behaviours on perceptions of overall health. *Applied Psychology: Health and Well-Being*, 11(2), 240–261. <https://doi.org/10.1111/aphw.12151>
- Bocquier, A., Verger, P., Basdevant, A., Andreotti, G., Baretge, J., Villani, P., & Paraponaris, A. (2005). Overweight and obesity: Knowledge, attitudes, and practices of general practitioners in France. *Obesity Research*, 13(4), 787–795. <https://doi.org/10.1038/oby.2005.89>
- Campbell, K., Engel, H., Timperio, A., Cooper, C., & Crawford, D. (2000). Obesity management: Australian general practitioners' attitudes and practices. *Obesity Research*, 8(6), 459–466. <https://doi.org/10.1038/oby57>
- Centre for Disease Control and Prevention (2018). *Healthy Weight*. US Department of Health and Human Services CDC. Retrieved from <https://www.cdc.gov/healthyweight/index.html>
- Daigle, K. M., Gang, C. H., Kopping, M. F., & Gadde, K. M. (2019). Relationship between perceptions of obesity causes and weight loss expectations among adults. *Journal of Nutrition Education and Behavior*, 51(1), 86–90. <https://doi.org/10.1016/j.jneb.2018.08.015>
- Dalle Grave, R., Calugi, S., Molinari, E., Petroni, M. L., Bondi, M., Compare, A., Marchesini, G., & QUOVADIS Study Group (2005). Weight loss expectations in obese patients and treatment attrition: An observational multicenter study. *Obesity Research*, 13(11), 1961–1969. <https://doi.org/10.1038/oby241>
- Department of Health (2014). *Australia's physical activity and sedentary behaviour guidelines*. Australia Government Publishing Service.
- Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G* Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39(2), 175–191. <https://doi.org/10.3758/BF03193146>
- Fildes, A., Charlton, J., Rudisill, C., Littlejohns, P., Prevost, A. T., & Gulliford, M. C. (2015). Probability of an obese person attaining normal body weight: Cohort study using electronic health records. *American Journal of Public Health*, 105(9), e54–e59. <https://doi.org/10.2105/AJPH.2015.30277>
- Foster, G. D., Phelan, S., Wadden, T. A., Gill, D., Ermold, J., & Didie, E. (2004). Promoting more modest weight losses: A pilot study. *Obesity Research*, 12(8), 1271–1277. <https://doi.org/10.1038/oby.2004.161>
- Foster, G. D., Wadden, T. A., Vogt, R. A., & Brewer, G. (1997). What is a reasonable weight loss? Patients' expectations and evaluations of obesity treatment outcomes. *Journal of Consulting and Clinical Psychology*, 65(1), 79–85. <https://doi.org/10.1037/0022-006X.65.1.79>
- Franz, M. J., VanWormer, J. J., Crain, A. L., Boucher, J. L., Histon, T., Caplan, W., Bowman, J. D., & Pronk, N. P. (2007). Weight-loss outcomes: A systematic review and meta-analysis of weight-loss clinical trials with a minimum 1-year follow-up. *Journal of the American Dietetic Association*, 107(10), 1755–1767. <https://doi.org/10.1016/j.jada.2007.07.017>
- French, S. A., Perry, C. L., Leon, G. R., & Fulkerson, J. A. (1995). Dieting behaviors and weight change history in female adolescents. *Health Psychology: official Journal of the Division of Health Psychology, American Psychological Association*, 14(6), 548–555. <https://doi.org/10.1037/0278-6133.14.6.548>
- Garip, G., & Yardley, L. (2011). A synthesis of qualitative research on overweight and obese people's views and experiences of weight management. *Clinical Obesity*, 1(2–3), 110–126. <https://doi.org/10.1111/j.1758-8111.2011.00021.x>
- Hamman, R. F., Wing, R. R., Edelstein, S. L., Lachin, J. M., Bray, G. A., Delahanty, L., Hoskin, M., Kriska, A. M., Mayer-Davis, E. J., Pi-Sunyer, X., Regensteiner, J., Venditti, B., & Wylie-Rosett, J., for the Diabetes Prevention Program Research Group (2006). Effect of weight loss with lifestyle intervention on risk of diabetes. *Diabetes Care*, 29(9), 2102–2107. <https://doi.org/10.2337/dc06-0560>
- Hankey, C. R., Leslie, W. S., & Lean, M. E. J. (2002). Why lose weight? Reasons for seeking weight loss by overweight but otherwise healthy men. *International Journal of Obesity and Related Metabolic Disorders: journal of the International Association for the Study of Obesity*, 26(6), 880–882. <https://doi.org/10.1038/sj/ijo.0801999>

- Harrington, M., Gibson, S., & Cottrell, R. C. (2009). A review and meta-analysis of the effect of weight loss on all-cause mortality risk. *Nutrition Research Reviews*, 22(1), 93–108. <https://doi.org/10.1017/S0954422409990035>
- Harris, C. V., Bradlyn, A. S., Coffman, J., Gunel, E., & Cottrell, L. (2008). BMI-based body size guides for women and men: Development and validation of a novel pictorial method to assess weight-related concepts. *International Journal of Obesity* (2005), 32(2), 336–337. <https://doi.org/10.1038/sj.jco.0803704>
- Hartmann-Boyce, J., Johns, D. J., Jebb, S. A., & Aveyard, P., & Behavioural Weight Management Review Group (2014). Effect of behavioural techniques and delivery mode on effectiveness of weight management: Systematic review, meta-analysis and meta-regression. *Obesity Reviews*, 15(7), 598–609. <https://doi.org/10.1111/obr.12165>
- Hill, J. O., Wyatt, H., Phelan, S., & Wing, R. (2005). The National Weight Control Registry: is it useful in helping deal with our obesity epidemic? *Journal of Nutrition Education and Behavior*, 37(4), 206–210. [https://doi.org/10.1016/S1499-4046\(06\)60248-0](https://doi.org/10.1016/S1499-4046(06)60248-0)
- Kwan, S. (2009). Competing motivational discourses for weight loss: Means to ends and the nexus of beauty and health. *Qualitative Health Research*, 19(9), 1223–1233. <https://doi.org/10.1177/1049732309343952>
- Kwan, S. (2012). Lay perspectives on the biomedical paradigm on ‘obesity’: Theorizing weight, health and happiness. *Social Theory & Health*, 10(1), 61–77. <https://doi.org/10.1057/sth.2011.12>
- LeBlanc, E. S., Patnode, C. D., Webber, E. M., Redmond, N., Rushkin, M., & O’Connor, E. A. (2018). Behavioral and pharmacotherapy weight loss interventions to prevent obesity-related morbidity and mortality in adults: Updated evidence report and systematic review for the US Preventive Services Task Force. *JAMA*, 320(11), 1172–1191. <https://doi.org/10.1001/jama.2018.7777>
- Lewis, S., Thomas, S. L., Blood, R. W., Hyde, J., Castle, D. J., & Komesaroff, P. A. (2010). Do health beliefs and behaviors differ according to severity of obesity? A qualitative study of Australian adults. *International Journal of Environmental Research and Public Health*, 7(2), 443–459. <https://doi.org/10.3390/ijerph7020443>
- Mann, T., Tomiyama, A. J., Westling, E., Lew, A.-M., Samuels, B., & Chatman, J. (2007). Medicare’s search for effective obesity treatments: Diets are not the answer. *The American Psychologist*, 62(3), 220–233. <https://doi.org/10.1037/0003-066X.62.3.220>
- Mattingly, B. A., Stambush, M. A., & Hill, A. E. (2010). Shedding the pounds but not the stigma: Negative attributions as a function of a target’s method of weight loss. *Journal of Applied Biobehavioral Research*, 14(3), 128–144. <https://doi.org/10.1111/j.1751-9861.2009.00045.x>
- National Health and Medical Research Council (2013a). *Australian dietary guidelines*. NHMRC. Retrieved from <https://www.nhmrc.gov.au/guidelines-publications/n55>
- National Health and Medical Research Council (2013b). *Clinical practice guidelines for the management of overweight and obesity in adults, adolescents and children in Australia*. NHMRC. Retrieved from <https://www.nhmrc.gov.au/guidelines-publications/n57>
- National Institute of Health (1998). *Clinical Guidelines on the Identification, and Treatment of Overweight and Obesity in Adults: The Evidence Report*. NIH Publication. Retrieved from https://www.nhlbi.nih.gov/files/docs/resources/heart/ob_gdlns.pdf
- National Institute for Health and Care Excellence (2014). *Weight management: Lifestyle services for overweight and obese adults*. Public health guidelines. Retrieved from <https://www.nice.org.uk/guidance/ph53/chapter/1-Recommendations>
- Neumark-Sztainer, D., Wall, M., Story, M., & Standish, A. R. (2012). Dieting and unhealthy weight control behaviors during adolescence: associations with 10-year changes in body mass index. *Journal of Adolescent Health*, 50(1), 80–86. <https://doi.org/10.1016/j.jadohealth.2011.05.010>
- O’Brien, K., Venn, B. J., Perry, T., Green, T. J., Aitken, W., Bradshaw, A., & Thomson, R. (2007). Reasons for wanting to lose weight: Different strokes for different folks. *Eating Behaviors*, 8(1), 132–135. <https://doi.org/10.1016/j.eatbeh.2006.01.004>
- Pétre, B., Scheen, A., Ziegler, O., Donneau, A.-F., Dardenne, N., Husson, E., Albert, A., & Guillaume, M. (2018). Weight loss expectations and determinants in a large community-based sample. *Preventive Medicine Reports*, 12, 12–19. <https://doi.org/10.1016/j.pmedr.2018.08.005>

- Puhl, R. M., & Heuer, C. A. (2009). The stigma of obesity: A review and update. *Obesity (Silver Spring, MD)*, 17(5), 941–964. <https://doi.org/10.1038/oby.2008.636>
- Riddell, L. J., & Inman, V. (2007). Body weight and weight loss: Are health messages reaching their target? *Asia Pacific Journal of Clinical Nutrition*, 16(4), 683–687. <https://doi.org/10.6133/apjcn.2007.16.4.14>
- Roy, M., & Gauvin, L. (2010). Having a personal weight goal that mismatches healthy weight recommendations increases the likelihood of using unhealthy behaviors among a representative population-based sample of adolescents. *Eating Behaviors*, 11(4), 281–287. <https://doi.org/10.1016/j.eatbeh.2010.08.002>
- Sasdelli, A. S., Petroni, M. L., Paoli, A. D., Collini, G., Calugi, S., Dalle Grave, R., & Marchesini, G. (2018). Expected benefits and motivation to weight loss in relation to treatment outcomes in group-based cognitive-behavior therapy of obesity. *Eating and Weight Disorders*, 23(2), 205–214. <https://doi.org/10.1007/s40519-017-0475-9>
- Teixeira, P. J., Going, S. B., Houtkooper, L. B., Cussler, E. C., Metcalfe, L. L., Blew, R. M., Sardinha, L. B., & Lohman, T. G. (2004). Pretreatment predictors of attrition and successful weight management in women. *International Journal of Obesity*, 28(9), 1124–1133. <https://doi.org/10.1038/sj.jco.0802727>
- Thomas, D. M., Kyle, T. K., & Stanford, F. C. (2015). The gap between expectations and reality of exercise-induced weight loss is associated with discouragement. *Preventive Medicine*, 81, 357–360. <https://doi.org/10.1016/j.ypmed.2015.10.001>
- Timperio, A., Cameron-Smith, D., Burns, C., & Crawford, D. (2000). The public's response to the obesity epidemic in Australia: Weight concerns and weight control practices of men and women. *Public Health Nutrition*, 3(4), 417–424. <https://doi.org/10.1017/S13689980000000483>
- Tomiyaama, A. J., Ahlstrom, B., & Mann, T. (2013). Long-term effects of dieting: Is weight loss related to health. *Social and Personality Psychology Compass*, 7(12), 861–877. <https://doi.org/10.1111/spc3.12076>
- Van Gaal, L. F., Wauters, M. A., & De Leeuw, I. H. (1997). The beneficial effects of modest weight loss on cardiovascular risk factors. *International Journal of Obesity and Related Metabolic Disorders: Journal of the International Association for the Study of Obesity*, 21, 5–9.
- Vidal, J. (2002). Updated review on the benefits of weight loss. *International Journal of Obesity*, 26(S4), S25–S28. <https://doi.org/10.1038/sj.ijo.802215>
- Wing, R. R., Lang, W., Wadden, T. A., Safford, M., Knowler, W. C., Bertoni, A. G., Hill, J. O., Brancati, F. L., Peters, A., Wagenknecht, L., ... & Look AHEAD Research Group (2011). Benefits of modest weight loss in improving cardiovascular risk factors in overweight and obese individuals with type 2 diabetes. *Diabetes Care*, 34(7), 1481–1486. <https://doi.org/10.2337/dc-2415>