

An Experimental Test of the Effects of a Target Person's Body Weight and Engagement with Health Behaviours on Perceptions of Overall Health

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Background: Public health campaigns commonly emphasise the association between excess weight and poor health. The present study aimed to examine the effect of information about weight and engagement with health behaviours on judgements of a person's health. **Method:** In two experimental studies, participants were asked to evaluate a target person's health and to make recommendations about that person's health-related behaviours. In Study 1 ($n = 306$), we manipulated the target's behaviours (healthy, unhealthy) and body weight (normal, overweight, obese); in Study 2 ($n = 192$), we manipulated the behaviour of an overweight target (healthy, unhealthy). **Results:** Study 1 found that the obese target was consistently rated as less healthy than the normal-weight target, whereas the overweight target was only rated as less healthy when her behaviours were unhealthy. Study 2 found that the overweight target's weight was viewed as being more harmful to her health when she engaged in unhealthy behaviours. Recommendations to lose weight were most common for the obese targets (with healthy or unhealthy behaviours), and for the overweight target with unhealthy behaviours. **Conclusions:** Whereas obesity appears to be viewed as harmful to health independent of health behaviours, the extent to which overweight is perceived as harmful depends on the overweight individual's diet and exercise behaviours.

Keywords: body weight, health, lay beliefs, obesity, overweight

INTRODUCTION

Over the past two decades, a number of public health campaigns have aimed to encourage people to engage in healthy dietary and exercise practices specifically for the purpose of achieving and maintaining a “healthy weight” (e.g.

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LiveLighter, Measure Up, Strong4Life, etc.).¹ Such campaigns reflect the broader tendency within health discourse to emphasise the role of body weight (and weight loss) in determining health, and to promote diet and exercise behaviours primarily via their relation to weight control (O'Hara & Gregg, 2010; Rodgers, 2016). Contrary to the messages portrayed by the media, there is conflicting evidence and ongoing unresolved scientific debate regarding whether and to what extent individuals should focus on their weight specifically in order to improve their health (Bacon & Aphramor, 2011; Blair & LaMonte, 2005; Campos, Saguy, Ernsberger, Oliver, & Gaesser, 2005; Ernsberger & Koletsky, 1999; Stefan, Häring, & Schulze, 2017; Tylka et al., 2014).

Although research does point to excess weight as a risk factor for a range of adverse health outcomes (Bray, 2004; Kivimäki et al., 2017), other factors, such as cardiovascular fitness, metabolic health, and level of engagement with physical activity, may be stronger predictors than weight of an individual's health (Crespo et al., 2002; Eckel et al., 2018; Farrell, Braun, Barlow, Cheng, & Blair, 2002; Fogelholm, 2010). Several interventions have also found that improvements in eating or exercise behaviours can result in health benefits even among individuals who do not lose any weight (Appel et al., 1997; King, Hopkins, Caudwell, Stubbs, & Blundell, 2009). These findings are particularly notable in light of the fact that, contrary to the high expectations of weight-loss patients (Foster, Wadden, Vogt, & Brewer, 1997), lifestyle interventions typically produce only modest amounts of weight loss (Powell, Calvin, & Calvin, 2007). Therefore, although it is not yet clear to what extent individuals should focus on their weight in relation to health, it is evident that people across the weight spectrum benefit from eating well and exercising regularly (Matheson, King, & Everett, 2012; Sotos-Prieto et al., 2017).

Lay Beliefs Regarding Weight and Health

The extent to which people view excess weight as harmful to health is likely to impact how they evaluate their own health and that of others, and to influence the types of health behaviours that they view as necessary for individuals across the weight spectrum. For example, it is possible that individuals with obesity who believe that they must achieve and maintain a "healthy weight" in order to be healthy might attempt to lose weight at any cost. Alternatively, such individuals might attempt to lose weight via healthy behaviours, such as exercise, but

¹ The LiveLighter Campaign started in Western Australia in 2012, and is now an Australia-wide campaign (<https://livelighter.com.au/About/History>). Measure Up was a social marketing campaign released in 2009 in Australia (<https://www.iccp-portal.org/measure-campaign>). Strong4Life was an American anti-obesity media campaign launched by Children's HealthCare of Atlanta in 2011 (e.g. <https://www.ajc.com/news/local/grim-childhood-obesity-ads-stir-critics/GVsvivE43BYQAqe6bmufd70/>; <https://www.youtube.com/watch?v=xUmp67YDIHY>).

then cease engaging with those behaviours if they fail to reach a desired weight (Tylka et al., 2014). Equally, it is possible that many individuals in the normal-weight range have unhealthy dietary and/or exercise behaviours as a result of the presumption that weight alone is a good indication of one's health (Souza, 2015). Therefore, from a public health perspective it is clearly important to understand what laypeople believe about the relationship between health behaviours, weight and health, because this could have implications for people's engagement with health-related behaviours.

People in the normal-weight range are generally viewed as healthy (indeed, the normal-weight range is often referred to as the "healthy-weight range") and people who are overweight or obese are generally viewed as unhealthy. The terms "skinny" and "thin" are both associated with being fit and healthy (Greenleaf, Starks, Gomez, Chambliss, & Martin, 2004), whereas individuals who are described as "fat", "overweight", or "obese" are perceived as being less healthy (Smith, Schmoll, Konik, & Oberlander, 2007). Participants across several qualitative studies reported believing that both overweight and obesity are "bad" for one's health (Fraser, Leveritt, & Ball, 2013; Kwan, 2009, 2012; Thomas, Olds, Pettigrew, Randle, & Lewis, 2014). However, at least some participants expressed the belief that it is possible for an individual to be overweight and healthy (Bennett et al., 2006; Thomas et al., 2014). Therefore, although it appears that people generally view individuals who are overweight or obese as unhealthy, there may be flexibility in terms of how people view the health of individuals who are overweight.

Research also suggests that people make assumptions about the level of health behaviours engaged in by an individual based on that person's body size. Individuals who are overweight are stereotyped as being lazy, inactive, and likely to overeat (Sikorski, Luppá, Brähler, König, & Riedel-Heller, 2012), and individuals with obesity are explicitly rated as being less active and as having a less healthy diet than are individuals in the normal-weight range (Fardouly & Vartanian, 2012). Indeed, there is anecdotal evidence that, when obese individuals do report engaging in healthy behaviours, they are not believed by others. Conversely, people who are thin are typecast as being active and physically fit (Greenleaf, Chambliss, Rhea, Martin, & Morrow, 2006; Greenleaf et al., 2004). In light of these assumptions about behaviour, it is unclear to what extent the belief that people who are overweight and obese are unhealthy is driven by the belief that excess weight is unhealthy, or by the belief that these individuals do not adequately engage in health behaviours.

The aim of the current research was to disentangle the unique and interactive effects of body weight and engagement with health behaviours on perceptions of health. Study 1 assessed the combined effects of information about weight and diet- and exercise-related behaviours on ratings of a target's health. Study 2 examined the impact of an overweight target's behaviours on the perceived

health impact of her weight. The second aim of this research was to examine whether beliefs about weight influence the types of behaviours that are seen as appropriate for people across the weight spectrum. We report how we determined our sample size, all data exclusions, all manipulations, and all measures for both studies.

STUDY 1

The purpose of Study 1 was to determine the perceived health impact of overweight and obesity once accounting for different levels of engagement with health behaviours, and to examine the types of health-related behaviours that are recommended to individuals on the basis of their weight status. Participants were shown an image of a female target who was either a normal weight, overweight, or obese, and were provided with information about the target's current diet- and exercise-related behaviours (healthy vs. unhealthy). Given previous research (e.g. Thomas et al., 2014) and the media emphasis on excess weight as a risk factor for poor health (Hilton, Patterson, & Teyhan, 2012), it was hypothesised that (1) both the overweight and obese targets would be perceived as less healthy than the normal-weight target irrespective of their engagement with health behaviours. Additionally, it was hypothesised that (2) more health-related behaviours would be recommended to the overweight and obese targets than to the normal-weight targets, and (3) the overweight and obese targets with healthy behaviours would be viewed as providing more misleading information than would the normal-weight, healthy-behaviour target.

Method

Participants. A sample size of 50 participants per condition was determined to be sufficient to detect a small-medium effect size ($f = 0.2$) with 80 per cent power in a between-group design (G*Power; Faul, Erdfelder, Lang, & Buchner, 2007). Participants were then oversampled by 10 per cent in order to account for any participants not meeting inclusion criteria. Thus, 335 participants based in the United States were recruited through Amazon's Mechanical Turk (MTurk), which is an online platform that allows individuals to complete research studies in return for a small payment. Participants were excluded from analysis if they indicated that they did not read the target's profile carefully ($n = 9$) or if they responded incorrectly to the attention check question ($n = 20$). The final sample consisted of 306 adults (52% women; 80% Caucasian). Participants' mean age was 37.94 ($SD = 12.15$; range = 19–73), and their mean body mass index (BMI; kg/m^2) was 27.01 ($SD = 6.68$; range = 16.72–64.85). The university's ethics committee approved this study, and all participants provided informed consent before completing the survey.

TABLE 1
Diet- and Exercise-Related Behaviours Described in the Healthy- and Unhealthy-
Behaviour Conditions (Study 1)

<i>Behaviours</i>	<i>Healthy</i>	<i>Unhealthy</i>
Fruits	2 serves/day	0 serves/day
Vegetables	4–5 serves/day	0–1 serves/day
Whole grains	4–5 serves/day	0–1 serves/day
Discretionary food	0 serves/day	>4 serves/day
Home-cooked meals	6–7 dinners/week	0 dinners/week
Sedentary time	Mostly standing each day, with some walking	Mostly sitting each day
Aerobic exercise	101–200 minutes/week	<30 minutes/week
Strength training	2 days/week	0 days/week

Materials. The cover story used in the current study was that participants were evaluating applications for health insurance. Six applications were created in order to manipulate information about the target's weight and level of engagement with diet- and exercise-related behaviours. Profiles were identical with the exception of weight and health behaviour information, and described the target as being a female, married, 31-year-old social worker earning \$40,001–\$60,000 per year. All targets were also described as non-smokers and reported drinking alcohol 1–2 days/week. Weight information was manipulated via a photograph of the target. Images were taken from the female version of the Body Size Guides Scale (Harris, Bradlyn, Coffman, Gunel, & Cottrell, 2008), and portrayed the target as either normal weight, overweight, or obese (images B, E, and I, respectively). A female target was used because weight concerns tend to be more common amongst women than men (Wardle & Johnson, 2002). Health behaviour information was manipulated by providing participants with a questionnaire that was ostensibly completed by the target about her current diet and exercise behaviours. The responses indicated that the target engaged in healthy behaviours or unhealthy behaviours,² as outlined in Table 1. The “healthy behaviours” were in line with Australian dietary and physical activity guidelines (Department of Health, 2014; NHMRC, 2013), and the “unhealthy behaviours” reflected the least healthy option available across every item in the questionnaire. All targets were described as having engaged in their respective behaviours for the past 5 years. A pilot study using a separate MTurk sample ($N = 173$) confirmed that, in the absence of health behaviour information, the overweight and

² A third (moderate health behaviour) condition was included in the study design, but the results for that condition were largely indistinguishable from the healthy-behaviour condition across all dependent variables. Thus, for clarity of presentation, the moderate health behaviour condition is not included in the analyses presented below,

obese targets were viewed as less healthy than was the normal-weight target with approximately equal decreases in perceived health with increasing weight category and, in the absence of weight information, the unhealthy-behaviour target was viewed as less healthy than was the healthy-behaviour target.

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 any discrete labels; instead, participants were informed that higher values indicated greater perceived health.

Recommended Health Insurance Premium. Participants were asked to use a slider to recommend an appropriate annual health insurance premium for the target (ranging from \$2,500 to \$5,300)³ in \$400 increments. Although not reported here, the same pattern of results emerged for recommended health insurance premiums as for overall perceived health.

Recommended Health Behaviours. Participants viewed a list of 13 behaviours and were asked to select any behaviour(s) that they would advise the target to change in order to improve her health (adapted from Roy & Gauvin, 2010). A principal components analysis (PCA) with oblique rotation (direct oblimin) was conducted to determine how these behaviours clustered together. PCA revealed three components that had eigenvalues greater than one and collectively explained 64 per cent of total variance. The three factors separated into general health behaviours (six items: "consume more fruits and vegetables", "increase level of exercise", "improve diet quality", "incorporate more walking into each day", "decrease consumption of discretionary foods", "decrease time spent being sedentary"), weight-focused behaviours (five items: "count calories", "go on a diet", "lose weight", "eat less fat", "cut down on carbohydrates"), and extreme weight-loss behaviours (two items: "skip meals", "take diet pills").

Perceived Misleadingness. Participants were asked to rate the extent to which they suspected the target of providing misleading information (0 = *not at all*, 3 = *to a large extent*).

Procedure. Participants completed the study online and were informed that they would be asked to review and evaluate people's applications for health insurance. Participants were reimbursed \$1.00 for completing the study. Participants were randomly allocated to one of the six profiles described above, and were then asked to estimate the target's overall health. In line with the cover story, participants were then asked to recommend an appropriate health insurance premium for the target. Next, participants viewed the list of behaviours and

³ Data related to health insurance premiums were sourced from <http://www.ncsl.org/research/health/health-insurance-premiums.aspx>. The range was approximated from the table of monthly premiums for a single, non-smoker (2014–15), with the lowest being \$210/month and up to \$441/month.

were asked to select any behaviour(s) that they would recommend to the target in order to improve her health. After making behaviour recommendations, participants were asked to rate the extent to which they suspected the target of providing misleading information. 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. Two-way ANOVAs with Bonferroni-corrected simple main effects were used to assess the impact of target weight and health behaviours on perceived health, as well as the perceived misleadingness of the target's responses on the health behaviour questionnaire. Negative binomial regression was used to assess the influence of condition on the number of health and weight-focused behaviours recommended to each target. Given that very few participants recommended either extreme weight-loss behaviour, participants were dichotomised into those who recommended one or both extreme weight-loss behaviours (coded as 1) and participants who did not recommend either behaviour (coded as 0). Two separate chi-square tests of independence were then conducted to examine whether there was a difference in extreme weight-loss behaviour recommendations across target weight categories, and across target health behaviour categories. Participant BMI was not significantly different across groups, $F_{(5,300)} = 1.91, p = .09$, and was not significantly correlated with any dependent variables. Thus, BMI was not entered as a covariate in any of the analyses. Group means (and standard deviations) for all outcome variables are displayed in Table 2.

Results

Perceived Health. There was a significant main effect of the target's weight on perceived health, $F_{(2,300)} = 56.65, p < .001, \eta^2_p = .27$. Both the overweight and obese targets were perceived as significantly less healthy than was the normal-weight target, $ps \leq .002$. There was a significant main effect of health behaviours such that the healthy-behaviour targets were perceived as significantly healthier than were the unhealthy-behaviour targets, $F_{(1,300)} = 226.09, p < .001, \eta^2_p = .43$. These main effects were qualified by a significant interaction between target weight and behaviours, $F_{(2,300)} = 4.60, p = .01, \eta^2_p = .03$. Simple effects analyses indicated that the obese target was rated as less healthy than was the normal-weight target at both levels of health behaviours ($ps < .001$). In contrast, the overweight target was only perceived as less healthy than was the normal-weight target when both targets had unhealthy behaviours, $p = .004$; when both targets had healthy behaviours, there was no difference in perceived health, $p = .27$. There was no significant difference between the normal-weight/unhealthy-behaviour target and the obese/healthy-behaviour target in terms of perceived health, $t_{(101)} = -0.29, p = .77$.

General Health Behaviours. There was a significant main effect of weight on the number of health behaviours recommended to the target, $\chi^2_{(2)} = 53.60, p < .001$. Both the obese and the overweight targets were advised to engage in significantly more health behaviours than was the normal-weight target, $ps \leq .047$. There was also a main effect of health behaviours such that unhealthy-behaviour targets were recommended to engage in significantly more health behaviours than were healthy-behaviour targets, $\chi^2_{(1)} = 237.62, p < .001$. These main effects were qualified by a significant interaction between target weight and behaviours, $\chi^2_{(2)} = 23.19, p < .001$. At both levels of the target’s health behaviours, the obese target was recommended to engage in significantly more health behaviours than was the normal-weight target, $ps \leq .001$. In contrast, the overweight target was only recommended to engage in more health behaviours than was the normal-weight target when both targets reported unhealthy behaviours, $p = .03$ (although this difference was not significant at the Bonferroni-corrected alpha of 0.006); when the overweight and normal-weight targets both had healthy behaviours, there was no difference in the number of health behaviours recommended, $p = .23$.

Weight-Focused Behaviours. There was a significant main effect of weight on the number of weight-focused behaviours recommended to the target, $\chi^2_{(2)} = 123.33, p < .001$. Both the obese and overweight targets were advised to engage in significantly more weight-focused behaviours than was the normal-

TABLE 2
Group Means (SDs) for Normal-Weight, Overweight, and Obese Targets as a Function of Health Behaviour Information (Study 1)

Dependent variable	Target’s behaviours	Target weight		
		Normal weight	Overweight	Obese
Perceived health	Unhealthy	52.60 ^a (20.70)	41.33 ^b (15.44)	31.51 ^c (17.90)
	Healthy	84.38 ^c (14.97)	78.38 ^c (13.28)	53.83 ^d (21.87)
General health behaviours	Unhealthy	3.78 ^a (2.23)	4.67 ^{ab} (1.68)	5.12 ^b (1.53)
	Healthy	0.72 ^c (1.16)	0.94 ^c (1.24)	2.21 ^d (2.03)
Weight-focused behaviours	Unhealthy	0.50 ^a (0.91)	2.21 ^b (1.72)	2.86 ^b (1.70)
	Healthy	0.16 ^c (0.51)	0.84 ^d (1.18)	2.34 ^b (1.69)
Extreme weight-loss behaviours	Unhealthy	0.00 (0.00)	0.06 (0.24)	0.10 (0.36)
	Healthy	0.00 (0.00)	0.00 (0.00)	0.17 (0.51)
Misleading	Unhealthy	0.62 ^a (0.78)	0.52 ^a (0.64)	0.45 ^a (0.61)
	Healthy	0.88 ^{ab} (0.85)	1.14 ^b (0.97)	1.89 ^c (1.09)

Note: For each dependent variable (except extreme weight-loss behaviours), means within a row or column with different superscript letters are significantly different at $p = .006$ (0.05/9; Bonferroni-corrected for multiple pairwise comparisons).

weight target, $ps < .001$. There was also a main effect of health behaviours, such that unhealthy-behaviour targets were recommended to engage in significantly more weight-focused behaviours than were healthy-behaviour targets, $\chi^2_{(1)} = 24.60$, $p < .001$. These main effects were qualified by a significant interaction between target weight and behaviours, $\chi^2_{(2)} = 14.35$, $p = .001$. Simple effects analyses indicated that participants recommended that both the normal-weight and overweight targets engage in significantly more weight-focused behaviours when these targets reported unhealthy behaviours, compared to when they reported healthy behaviours, $ps < .003$. In contrast, the number of weight-focused behaviours recommended to the obese target was much higher and did not significantly differ when the target reported healthy or unhealthy behaviours, $p = .12$. It is particularly notable that twice as many participants recommended that the overweight target should lose weight when she reported unhealthy behaviours (60%) compared to when she reported healthy behaviours (30%). Conversely, the majority of participants recommended that the obese target lose weight regardless of her level of engagement with health behaviours (~78%), and only 2 per cent of participants across conditions recommended weight loss to the normal-weight target.

Extreme Weight-Loss Behaviours. There was a moderate, statistically significant association between target weight and the recommendation to engage in extreme weight-loss behaviours, $\chi^2_{(2)} = 12.23$, $\phi = 0.20$, $p = .002$. In total, 10 per cent of participants who viewed an obese target recommended that the target engage in at least one extreme weight-loss behaviour, compared to 3 per cent of participants who viewed an overweight target and 0 per cent of participants who viewed a normal-weight target. There was no significant association between the target's health behaviours and recommendations to engage in extreme weight-loss behaviours, $\chi^2_{(1)} = .08$, $p = .78$.

Belief that the Target Provided Misleading Information. There was a significant main effect of the target's weight on perceptions that the target provided misleading information, $F_{(2,300)} = 7.19$, $p = .001$, $\eta^2_p = .05$. The obese target was suspected of providing misleading information to a significantly greater extent than was the normal-weight target, $p < .001$; however, there was no significant difference in perceived misleadingness between the overweight and normal-weight targets, $p = .50$. Importantly, when the suspicious participants were excluded from analyses, the obese target was still consistently viewed as significantly less healthy than was the normal-weight target, which suggests that the suspicious participants did not account for the perceived negative impact of obesity on health.

There was also a significant main effect of health behaviours, such that the healthy-behaviour target was suspected of providing misleading information to a greater extent than was the unhealthy-behaviour target, $p < .001$. These main

effects were qualified by a significant interaction between target weight and behaviours, $F_{(2,300)} = 13.15, p < .001, \eta^2_p = .08$. There were no significant differences in perceived misleadingness between the obese, overweight, and normal-weight targets' profiles when the targets reported unhealthy behaviours, $ps > .94$. However, when the target reported healthy behaviours, the obese target's application was perceived as being significantly more misleading than was the normal-weight target's application, $p < .001$. There was no significant difference in the perceived misleadingness of the normal-weight and overweight targets' profiles when both targets reported healthy behaviours, $p = .37$.

Discussion

As hypothesised, the obese target was reliably viewed as less healthy than was the normal-weight target. Given that these results were observed when matching across the targets' health behaviours, the current findings suggest that the lay public considers obesity per se to be detrimental to one's health. This conclusion is consistent with previous qualitative research (Thomas et al., 2014), and indicates that the perception that obese individuals are unhealthy is not solely due to beliefs that people with obesity have poor health behaviours. Contrary to hypotheses, however, the overweight target was only perceived as less healthy than the normal-weight target when both targets had unhealthy behaviours. Indeed, when the overweight target was described as eating well and exercising regularly, the fact that she was overweight did not significantly diminish her perceived health relative to the normal-weight target. Moreover, significantly fewer participants believed that the overweight target needed to lose weight when her behaviours were healthy, relative to when her behaviours were unhealthy. Taken together, these findings suggest that the overweight target's engagement with health behaviours (or lack thereof) influenced how harmful people perceived her weight to be to her health.

There are several possible ways in which the overweight target's behaviours could have influenced perceptions of her weight. It may be that when the overweight target reported engaging in healthy behaviours, people literally perceived her as being lighter than they did when her behaviours were unhealthy. If so, the observed decrease in weight-loss recommendations for the healthy-behaviour target might wholly be explained by the perception that this target had less weight to lose. Similarly, people may have been more likely to categorise the target as "normal weight" when her behaviours were healthy. This possibility would be in line with previous research, which found that people's assessment of whether others are a "normal weight" or "overweight" can be influenced by external factors, and that these judgements influence the extent to which people believe that an individual needs to lose weight (Robinson & Kirkham, 2014). A third possibility is that people believe that the harmful effects of overweight can be moderated through engagement with healthy behaviours. The purpose of Study 2 was

to investigate the multiple ways in which engagement with health behaviours might influence perceptions of an overweight individual's weight and health.

STUDY 2

Study 2 was conducted to examine whether the overweight target's level of engagement with health behaviours (i.e. healthy vs. unhealthy) influenced estimates of her weight, perceptions of her weight status, and the perceived harmfulness of her weight. The current study also investigated whether any of these factors explain the differences in weight-loss recommendations that were observed in Study 1. It was hypothesised that: (1) the unhealthy-behaviour target would be viewed as heavier, (2) the weight status of the unhealthy-behaviour target would be viewed as higher, and (3) the weight of the unhealthy-behaviour target would be viewed as more harmful to her health. Furthermore, it was hypothesised that one or more of those differences would account for the increase in weight-loss recommendations to the unhealthy-behaviour target.

Method

Participants. The Monte Carlo power analysis for indirect effects application was used to determine an appropriate sample size (https://schoemanna.shinyapps.io/mc_power_med/; Schoemann, Boulton, & Short, 2017). A sample size of 200 was determined to be sufficient to detect significant effects in a serial mediation model with 80 per cent power, assuming a moderate correlation between variables ($r = 0.35$). Two hundred and five participants completed the survey through MTurk. Thirteen participants were excluded because they reported that they did not read the target's profile carefully, leaving 192 participants in the final sample (57% men; 76% Caucasian). The mean age of participants was 34.55 ($SD = 12.04$; range = 20–71), and their mean BMI was 25.84 ($SD = 5.70$; range = 13.64–51.78).

Measures. Perceived Health. The same scale was used as in Study 1.

Perceived Weight and Weight Status. Participants were asked to estimate the target's weight in pounds, and to estimate the target's weight status (1 = underweight, 2 = normal weight, 3 = overweight, 4 = obese).

Perceived Harmfulness of Weight and Weight-Loss Recommendations. On a 7-point scale (1 = *strongly disagree*, 7 = *strongly agree*), participants were asked to rate the extent to which they believed that the target's behaviours and characteristics would negatively impact her health, and the extent to which they thought that the target needed to change those same factors in order to improve her health. Only the items related to weight were of relevance to this study: "Eliza's weight would negatively impact her health" and "In order to improve her health, Eliza needs to lose weight."

Procedure. Participants were randomly allocated to view either the overweight target with healthy behaviours or the overweight target with unhealthy behaviours as described in Study 1. These profiles were identical to the profiles used in Study 1 with the exception that the target's height was added in Study 2. The target was described as being 5' 4", which is the average height for women in the United States. Height was added to ensure that estimates of the target's weight were not influenced by differences among participants with respect to their perceptions of the target's height. After viewing their assigned profiles, participants were asked to evaluate the target's overall health and then estimate the target's weight and weight status. Participants were also asked to rate the extent to which they believed the target's weight was harmful to her health, and the extent to which they believed the target needed to lose weight to improve her health.

Statistical Analyses. Independent samples *t*-tests were used to determine whether the two groups differed on each of the dependent variables (Table 3). Serial mediation analysis (Hayes, 2013) was then used to determine whether: (1) between-group differences in the perceived weight status of the target were due to differences in estimates of the target's weight (i.e. the a_1 - b_1 path; Figure 1), (2) between-group differences in the perceived health impact of the target's weight were due to differences in estimates of the target's weight or weight status (i.e. the a_1 - b_1 - c_1 path), and (3) between-group differences in recommendations to lose weight were due to perceived differences in the target's weight, the target's weight status, or the perceived health impact of the target's weight (i.e. the a_1 - b_1 - c_1 - d_1 path). All reported regression coefficients are unstandardised (Table 4). Participant BMI was positively correlated with estimates of the target's weight, $r = 0.18$, $p = .01$, and hence was entered as a covariate in the regression model.

TABLE 3
Group Means (*SDs*) for Overweight Targets as a Function of Health-Behaviour Information (Study 2)

<i>Dependent variable</i>	<i>Overweight target with:</i>		<i>Between groups t-test</i>		
	<i>Healthy behaviours</i>	<i>Unhealthy behaviours</i>	<i>t</i> ₍₁₉₀₎	<i>p</i>	<i>d</i>
Estimated weight	152.41 (31.91)	169.67 (30.67)	-3.82	<.001	0.55
Perceived weight status	2.61 (0.66)	3.06 (0.50)	-5.33	<.001	0.77
Effect of weight on health	4.02 (1.82)	5.99 (0.95)	-9.41	<.001	1.36
Weight-loss recommendations	4.61 (1.77)	5.96 (1.04)	-6.43	<.001	0.93

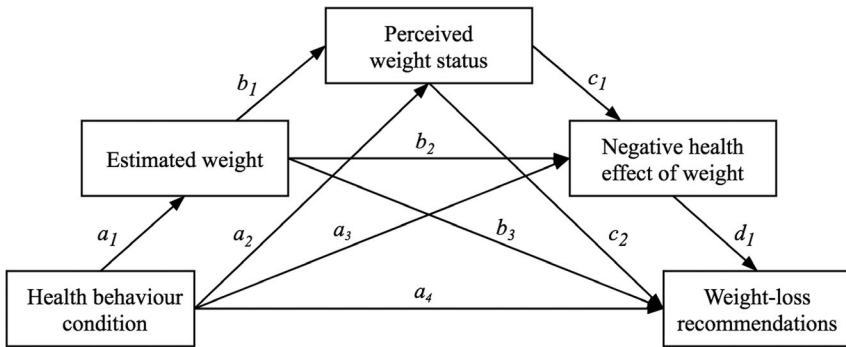


FIGURE 1. Serial mediation model (Study 2).

Results

Despite the fact that both conditions depicted the same overweight target, estimates of the target's weight and weight status were significantly lower when the target's behaviours were healthy, relative to when the target's behaviours were unhealthy. People also less strongly agreed that the target's *weight* would negatively impact her health when the target had healthy behaviours compared to when the target had unhealthy behaviours. As in Study 1, participants less strongly believed that the target should lose weight for her health when the target's behaviours were healthy, relative to when the target's behaviours were unhealthy.

The between-group difference in perceived weight status was partially explained by differences in the estimated weight of the target (indirect effect coefficient = 0.17, $SE = 0.06$, 95% CI = 0.07, 0.31). Furthermore, the between-group difference in the perceived impact of the target's weight on her health was partially explained by the fact that participants perceived her weight and weight status as being greater in the unhealthy-behaviour condition (total indirect effect coefficient = 0.77, $SE = 0.15$, 95% CI = 0.47, 1.08). Note that health behaviour condition remained a significant predictor of the perceived health impact of the target's weight even when controlling for perceived weight and perceived weight status, which indicates that the weight of the unhealthy-behaviour target was viewed as being more harmful than was the weight of the healthy-behaviour target for reasons other than the perceived increase in weight and weight status of the unhealthy-behaviour target. Finally, the between-group difference in weight loss recommendations was mediated by differences in the perceived weight status of the target and the perceived negative health effect of the target's weight (total indirect effect coefficient = 1.54, $SE = 0.21$, 95% CI = 1.15, 1.97). Estimates of the target's weight did not significantly predict recommendations to

lose weight once accounting for perceived weight status and the perceived health effects of weight, $b = 0.004$, $SE = 0.002$, $p = .12$.

Discussion

In replicating the findings of Study 1, Study 2 found that people were less likely to recommend weight loss to the overweight target when her behaviours were healthy, relative to when her behaviours were unhealthy. The current results indicated that this effect was explained by the fact that (1) the target with healthy behaviours was less readily categorised as “overweight”, and (2) the weight of the healthy-behaviour target was viewed as being less harmful to her health. The target with healthy behaviours was also perceived as weighing significantly less than the target with unhealthy behaviours, which in part contributed to the lower perceived weight status of the healthy-behaviour target. This effect of behaviours on estimates of the target’s weight may reflect a general tendency amongst individuals to utilise all available information when making decisions in ambiguous situations (Einhorn & Hogarth, 1988). For example, the health behaviour information may have shifted people’s estimates up or down within a range of plausible weights that had already been established by the photograph of the target. Although it does seem to be the case that people generally associate “overweight” with poorer health (e.g. Kwan, 2012), the results of Study 2 suggest that whether an overweight individual is actually perceived as being “overweight” is influenced by that individual’s engagement with health behaviours and, in addition, that overweight is perceived as being *more* harmful when the overweight individual also has unhealthy behaviours.

GENERAL DISCUSSION

The primary aim of the present study was to determine how information about weight and engagement with health behaviours influence evaluations of an individual’s health. As expected, Study 1 found that the obese target was consistently viewed as less healthy than was the normal-weight target, regardless of whether her behaviour was healthy or unhealthy. These findings suggest that the lay public views obesity per se as being detrimental to one’s health. In contrast, the overweight target was only viewed as less healthy than the normal-weight target when they both engaged in unhealthy behaviours; when the target reported eating well and exercising regularly, there was no difference in the perceived health of the normal-weight and overweight targets. Thus, the belief reported in some previous studies that it is *possible* for an individual to be both overweight and healthy (e.g. Bennett et al., 2006) may reflect a belief that overweight is relatively benign when the individual is engaging in healthy behaviours.

Study 2 found that people viewed the overweight target’s weight as being more harmful to her health when her behaviours were unhealthy, compared to

when her behaviours were healthy. This finding suggests that perceived health impact of an individual's weight is not determined *solely* by the quantity of excess weight. Indeed, whereas obesity seems to be viewed as unambiguously harmful to health, the perceived harmfulness of overweight appears to be influenced by the overweight individual's level of engagement with health behaviours. One possible explanation for this influence is that people believe that the impact of excess weight on health differs depending on the cause of the weight. For example, excess weight might only be viewed as harmful when it results from an unhealthy lifestyle, whereas excess weight that results from other causes (e.g. genetics, medication) may be viewed as more benign. This hypothesis is in line with previous research, which found that an overweight woman was actually rated as *healthier* when she was described as having a medical condition that caused her weight, compared to when no explanation was provided (Allison & Lee, 2015). Therefore, it is possible that when the overweight target in the current studies was sedentary and had a poor diet, participants assumed that these behaviours had *caused* her excess weight and, as a result, viewed that weight as being particularly "toxic" to the target's health.

Following this line of reasoning, the fact that the obese target in Study 1 was invariably viewed as unhealthy might suggest that obesity is always believed to reflect a "toxic" type of fat that is caused by unhealthy behaviours. That is, whereas people may accept that a person can be overweight for reasons other than unhealthy behaviours, this may not be the case for obesity. Indeed, the high degree of scepticism that was directed towards the obese target with healthy behaviours in Study 1 suggests that people find it implausible that an individual could become or remain obese while leading a healthy lifestyle. In contrast, participants were no more mistrusting of the overweight target with healthy behaviours than they were of the normal-weight target, suggesting that people believe there is a range of weights that naturally occur among individuals who lead a healthy lifestyle.

As a final point, Study 1 found no significant difference in terms of the perceived health of the normal-weight target with unhealthy behaviours and the obese target with healthy behaviours. This finding suggests that the perceived health impact of being obese is comparable to the perceived impact of engaging in almost no diet- and exercise-related behaviours. Given that individuals with obesity who are physically fit have a lower risk of all-cause mortality than do individuals in the normal-weight range who are unfit (Fogelholm, 2010), it would appear that laypeople's current beliefs regarding health are exaggerating the harms of excess weight and/or downplaying the benefits of engaging in healthy behaviours.

Behaviour Recommendations across Weight Categories

The belief that excess weight is harmful to one's health can influence the types of behaviours that are considered appropriate for individuals across the

weight spectrum. For example, participants in Study 1 consistently recommended that the obese target engage in weight-loss behaviours, such as dieting, in order to improve her health. Such recommendations indicate that people believe that it is both possible and necessary for obese individuals to lose weight through simple behaviour changes. Although modest levels of weight loss are achievable through sustained behaviour changes (Dombrowski, Knittle, Avenell, Araujo-Soares, & Sniehotta, 2014; Powell et al., 2007), research suggests that conventional dieting does not facilitate long-term weight loss (Mann et al., 2007). Moreover, weight loss per se does not necessarily improve the health of individuals with obesity (Harrington, Gibson, & Cottrell, 2009). Therefore, the present findings highlight a mismatch between the current scientific evidence and laypeople's beliefs regarding the importance of dieting and/or weight loss for the health of individuals with obesity.

Whereas weight loss was consistently recommended to the obese target in Study 1 irrespective of her level of engagement with health behaviours, significantly more participants recommended weight loss to the overweight target when her behaviours were unhealthy, compared to when her behaviours were healthy. Study 2 found that this increase in weight-loss recommendations was partially explained by participants' perceptions of the target's weight status. Specifically, participants were more likely to categorise the target as being "overweight" when her behaviours were unhealthy and, hence, were more likely to indicate that the target needed to lose weight in order to improve her health. This finding aligns with previous research showing that whether people categorised an overweight individual as being a "normal weight" or "overweight" was influenced by prior exposure to images of obese individuals, and that this categorisation influenced whether or not people recommended that the individual lose weight (Robinson & Kirkham, 2014). Therefore, it seems to be the case that laypeople are more likely to recommend weight loss to individuals they perceive as being "overweight", but that this perception is not solely determined by the individual's actual weight and, indeed, can be influenced by factors such as engagement with health behaviours (Study 2) and social norms regarding what is a "normal" weight (Robinson & Kirkham, 2014).

Although only a minority of participants recommended that a target engage in either extreme weight-loss behaviour, it is noteworthy that the few recommendations that did occur were primarily directed at the obese target. Given that these recommendations were made in the context of suggesting behaviours that would *improve* the target's health, it is possible that there is a minority of people who believe that it would be healthier to engage in drastic weight-loss behaviours than it would be to remain obese. Consistent with this idea, previous research has found that a subset of people report being willing to sacrifice aspects of their health (e.g. losing a year of one's life) in order to avoid being obese (Schwartz, Vartanian, Nosek, & Brownell, 2006). Future research should attempt to measure if and to what extent this "weight loss at all costs" mentality exists, given that it

may have important implications for whether individuals personally engage in extreme weight-loss behaviours.

In general, participants recommended a relatively high level of general health behaviours (e.g. eat more vegetables) to each of the targets that were described as currently engaging in unhealthy behaviours. It is interesting to note, however, that participants suggested fewer health behaviours to the normal-weight/unhealthy-behaviour target than they did to the obese target with the same unhealthy behaviours. This finding may reflect an unintended effect of the media's focus on weight as a determinant of health: that people will downplay the importance of healthy lifestyle behaviours among people who are in the normal-weight range. Indeed, previous qualitative research has found that many parents and children view health behaviours as primarily important for weight control and, consequently, they believe that such behaviours are less important for the health of those who are already "thin" (Thomas et al., 2014).

Limitations and Future Directions

One potential limitation of the current study is the operationalisation of the target's weight. Participants viewed pictures of each target, but were not provided with any objective information regarding weight or BMI, nor were they provided with a descriptive label (e.g. overweight). Although this operationalisation enhanced the ecological validity of the study, it is possible that people would respond differently to numerical information about weight and, in particular, that people would have viewed the overweight target as less healthy if they were informed that her BMI fell in the overweight range. The photographs selected in Study 1 also do not reflect the full diversity of possible body weights and shapes, and future research would benefit from investigating the effects of other variables, such as body fat distribution, on perceptions of overall health. The generalisability of the current results is limited by the fact that all targets were women. Given that people are more willing to label higher weights as "normal" for men (Harris et al., 2008), it may be that laypeople view excess weight as particularly harmful to the health of women. Thus, future research could include both male and female targets to increase the generalisability of these findings.

CONCLUSION

The present studies build on previous research on lay beliefs by demonstrating that participants tended to view obesity *per se* as harmful to health. Participants were, however, flexible in their perceptions of the health impacts of overweight. Although it seems that overweight is generally viewed as harmful (e.g. Kwan, 2012), the current results suggest that whether or not an individual is actually categorised as "overweight" depends to some extent on her level of engagement with health behaviours. Moreover, engagement with health behaviours appears

to influence how harmful an overweight individual's weight is perceived to be to that individual's health, which may reflect a belief that excess weight is more harmful when it results from an unhealthy lifestyle. The belief that excess weight is harmful appears to influence the types of behaviours that are seen as appropriate for individuals across the weight spectrum. Therefore, these results suggest that current public health campaigns may be over-emphasising the need for weight loss amongst overweight and obese individuals, and under-emphasising the need for normal-weight individuals to engage in healthy behaviours. Future campaigns might be more effective by encouraging all individuals to engage in healthy behaviours regardless of their weight, and regardless of the impact of those behaviours on weight.

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