Brief Cutting Edge Report
EPIDEMIOLOGY/GENETICS

Obesity

Desire for Weight Loss, Weight-Related Social Contact, and Body Mass Outcomes

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Objective: This study evaluated whether desiring to lose weight is associated with subsequent changes in social contact with individuals perceived to be thinner or heavier.
Methods: Longitudinal data were used to examine associations between desiring to lose weight at baseline and social contact with thinner and heavier individuals across a 1-year follow-up period ($N = 9{,}335$, 2013–2014 Gallup National Panel). How baseline social contact is linked to body mass outcomes among those desiring to lose weight ($N = 7{,}134$) was also examined.
Results: Over time, individuals desiring to lose weight interacted more frequently (+69 interactions/year, on average) and were more likely to possess social ties (tie probability +0.12) with heavier individuals while lessening their interactions (−51 interactions/year) and decreasing their likelihood of ties (tie probability −0.048) with thinner individuals. On the other hand, increasing contacts and interactions with thinner individuals, and declining contacts and interactions with heavier individuals, were linked to actual weight loss.
Conclusions: Using national longitudinal data, an important mismatch was demonstrated between the social contacts created by individuals desiring weight loss and the contextual factors possibly useful for weight loss. This may help to explain why weight loss is often unsuccessful.

Obesity (2016) **24**, 1434–1437. doi:10.1002/oby.21512

Introduction

Peer body mass may influence personal body mass (1-3). While most individuals report wanting to lose weight (4), it remains unclear whether this influences how these individuals build their social networks. Understanding how individuals may change their networks when desiring to lose weight is important to a more complete understanding of how social networks relate to body mass.

Research using experimental or clinical samples has found that individuals draw closer to others who are instrumental in achieving their social, occupational, or health-related personal goals, by feeling closer to these individuals or seeking them out socially (5-8). Personal motivation for weight loss may elicit changing relationships with thinner individuals perceived to be successful (3,5,7). Alternatively, a personal motivation to lose weight may elicit increased social involvement with heavier individuals. Individuals who desire to lose weight are more likely to experience weight discrimination and stigma (4,9-12). Stigma has been linked to lower subjective well-being and to the depletion of resources useful for weight loss (9,10,13). Individuals may manage stigma by selecting similarly heavy peers (11,14,15). However, whether this leads to patterned changes in social networks remains unclear.

Here, we use national longitudinal data to track self-reported social network changes and body mass outcomes associated with desiring to lose weight. We establish whether desiring to lose weight bears any important associations with one's subsequent network interactions and outcomes. With a fuller understanding of how social networks relate to weight loss, weight loss interventions may better address any interpersonal dynamics occurring outside clinical settings.

Methods

In 2013, randomly selected Web-based members of the Gallup national probability survey of American households ($N = 35{,}256$) were sent an email invitation to participate in a survey about "the various people that you spend your free time with and have

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Funding agencies: Research was supported by the Robert Wood Johnson Foundation.
Dislcosure: The authors declared no conflict of interest.
Author contributions: MAA conceptualized and conducted all data analysis and drafted the article. NAC provided input in the survey design and analytic approach and contributed to the writing.
Additional Supporting Information may be found in the online version of this article.
Received: 23 November 2015; **Accepted:** 9 March 2016; **Published online 26 May 2016. doi:10.1002/oby.21512**

TABLE 1 Associations between desiring to lose weight and social contact outcomes

	b	95% CI
Contact with thinner individuals (Wave 2)		
Model 1		
Has social contact (linear probability)	−0.048*	0.061 to −0.034
Model 2		
Total no. interactions/year	−51.08*	−64.25 to −37.91
Contact with heavier individuals (Wave 2)		
Model 3		
Has social contact (linear probability)	0.120*	0.106 to 0.134
Model 4		
Total no. interactions/year	68.88*	56.64 to 81.13

Desiring to lose weight is assessed at baseline (Wave 1). Unstandardized estimates are shown. For all models, $N = 9{,}332$. Estimates are obtained by full-information maximum likelihood and are adjusted for panel attrition probability, Wave 1 body mass and social contact, and control variables (education, age, sex, labor force and marital status, income, race; network size, density, and number of kin; self-rated physical and mental health). Standard errors are robust.
*$P < 0.001$ (two-tailed).

TABLE 2 Associations between weight-specific social contact and body mass outcomes, for those desiring to lose weight

	b	95% CI
BMI (Wave 2)		
Total no. social contacts (Wave 1)		
Model 5		
With thinner individuals	−0.082*	−0.124 to −0.041
With heavier individuals	0.015 (ns)	−0.026 to 0.056
Total interactions/year (hundreds; Wave 1)		
Model 6		
With thinner individuals	−0.0092**	−0.016 to −0.0022
With heavier individuals	0.015*	0.0084 to 0.022
Obesity (linear probability, BMI ≥ 30; Wave 2)		
Total no. social contacts (Wave 1)		
Model 7		
With thinner individuals	−0.026*	−0.033 to −0.020
With heavier individuals	0.0063***	0.0002 to 0.0124
Total interactions/year (hundreds; Wave 1)		
Model 8		
With thinner individuals	−0.0044*	−0.0052 to −0.0037
With heavier individuals	0.00187	0.00088 to 0.00287

Unstandardized estimates are shown. For all models, $N = 7{,}134$. Estimates are obtained by full-information maximum likelihood and are adjusted for panel attrition probability, Wave 1 body mass, and control variables (education, age, sex, labor force and marital status, income, race; network size, density, and number of kin; self-rated physical and mental health). Standard errors are robust.
*$P < 0.05$
**$P \leq 0.01$
***$P \leq 0.001$ (two-tailed).

important conversations with" (similar to Refs. 16 and 17). About 20,373 individuals participated (Wave 1), and 13,677 completed a follow-up survey (Wave 2, 2014). We focus on ostensibly healthy weight loss (baseline BMI ≥ 18, age 65 or younger; final $N = 9{,}335$; see Supporting Information).

Analytic strategy

We used multivariate regression models with a Bernoulli (normal) link to investigate social network changes associated with desiring to lose weight. Models 1 to 4 examine the adjusted associations between Wave 2 social contact with thinner and heavier individuals (i.e., weight-related social contact) and Wave 1 desire to lose weight, adjusted for Wave 1 social contact and body mass. Models 5 to 8 examine adjusted associations between Wave 2 body mass outcomes and Wave 1 weight-related social contact, adjusted for Wave 1 body mass and restricted to those who reported a desire to lose weight at Wave 1. Models of outcome change (Wave 2 – Wave 1 outcome) yielded highly similar coefficients. All regressions control for demographic, network, and health factors (education, age, sex, labor force and marital status, income, race; network size, density, and number of kin; and self-rated health) and are estimated under full-information maximum likelihood with attrition weighting (see Supporting Information for details and robustness checks).

Weight-related social contact

Gallup respondents nominated up to four contacts with whom they spend most of their social time ("Looking back over the past 12 months, think of up to four adults (ages 16 and over) with whom you spend the most free time. These adults could be members of your household, friends from work or school or elsewhere, family members or relatives, or others") (17). Respondents then rated each contact's body mass relative to their own: "Which of the following describes how you see [contact's] physical build (amount of body fat) compared to yourself?" (1 = much thinner than me, 2 = slightly/somewhat thinner, 3 = about the same build, 4 = slightly/somewhat heavier, 5 = much heavier). Frequency of social interaction also was assessed: in person, on the phone, email, text messaging, or social media ("Thinking over the past year, please indicate how often you interacted with [contact] in each of the following ways": 1 = every day/nearly every day, 2 = at least once a week, 3 = at least once a month, 4 = less than once a month, 5 = never). Responses were rescaled (to 275, 52, 12, 6, and 0 interactions/year, respectively) then summed across all contacts.

Body mass

Body mass index (BMI) was calculated from self-reports of weight and height, in the format of kg/m^2 (18). Obesity is body mass at or above 30 kg/m^2 (1 = obese, 0 = not obese).

Desire to lose weight

Respondents were asked, "Would you like to lose weight, stay at your present weight, or put on weight?" (4,18). We treated this

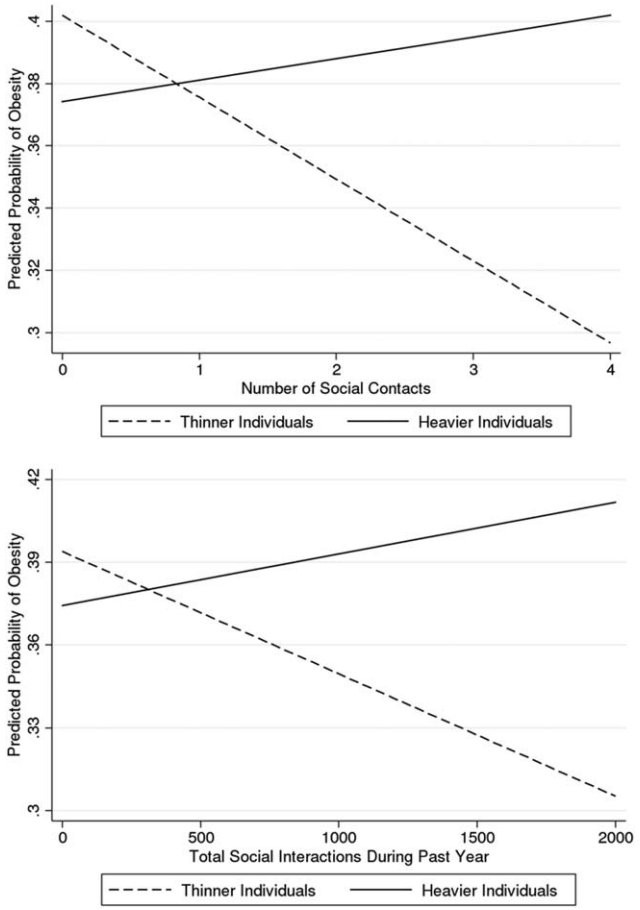

Figure 1 Probability of obesity at Wave 2 by level of weight-specific social contact. Plotted predictions are based on estimates in Table 2 (Models 7 and 8). For predictions, all other variables are held at their means.

dichotomously (1 = desire to lose weight, 0 = stay at present weight) and removed individuals desiring to put on weight (<2%) from analyses.

Results

At Wave 1, 30% of respondents reported an obese body mass (≥30 kg/m^2), and 78% of the entire sample desired to lose weight. On average, respondents named 2.66 individuals with whom they spend free time (16,19), and they reported spending time with individuals thinner or heavier than themselves frequently (i.e., about once per day; 283–387 interactions/year). Other descriptive statistics are given in the Supporting Information.

Table 1 shows multivariate regressions of weight-related social contact (Wave 2) on the desire to lose weight (Wave 1) (Models 1–4). Relative to desiring to maintain one's current weight at baseline, desiring to lose weight was associated with a 0.048 probability decrease in having a thinner social contact in 2014 (95% confidence interval (CI): −0.061 to −0.034) and likewise associated with 51.08 fewer social interactions with thinner individuals (95% CI: −64.25 to −37.91). Meanwhile, desiring to lose weight was linked positively to the probability of having at least one social contact who is heavier than oneself ($b = 0.120$, 95% CI: 0.106 to 0.134) and to a greater number of social interactions with heavier individuals ($b = 68.88$, 95% CI: 56.64 to 81.13).

Table 2 reports multivariate regressions of body mass outcomes (Wave 2) on weight-related social contact from the previous year (Wave 1). The top panel shows results for BMI (Models 5–6). Here, an addition of a thinner individual to one's social network was linked to a 0.082 decrease in body mass (95% CI: −0.124 to −0.041), corresponding to 0.57 pounds in a 5'10" person, whereas adding a heavier individual was linked to a 0.015 body mass increase, though this did not reach significance (95% CI: −0.026 to 0.056). Each additional 100 social interactions with thinner individuals predicted a 0.0092 decrease in body mass (95% CI: −0.016 to −0.0022), or a loss of 0.06 pounds in a 5'10" individual, whereas another 100 interactions with heavier individuals translated to a 0.015 mass increase (95% CI: 0.0084 to 0.022), or 0.10 pounds.

Similarly, in the bottom panel (Models 7–8), additions of thinner individuals were associated with lower obesity probability (−0.026, 95% CI: −0.033 to −0.020), as were increases in frequency of social interactions with these individuals (−0.0044 per additional hundred interactions; 95% CI: −0.00552 to 0.00337). In contrast, additions of heavier individuals were associated with heightened probability of obesity (0.0063, 95% CI: 0.0002 to 0.0124), as were more interactions with these individuals (0.00187 per additional hundred interactions; 95% CI: 0.00088 to 0.00287) (see Figure 1).

Discussion

This study reveals how weight loss motivations are associated with social network changes. While other studies have focused on how networks influence personal body mass (1-3), or on weight loss dynamics within clinical or experimental settings (5-8), they leave unclear how individuals may choose to build their social networks when desiring to lose weight.

Using national Gallup panel data supplemented by questions we added regarding social networks, we find that the desire to lose weight is associated with increased social contact with individuals perceived as heavier, as well as diminished contact with individuals perceived as thinner. Controlling for personal weight change produced highly similar findings, which is consistent with actual network changes rather than shifts in how peers are perceived relative to oneself. While these network changes may be consistent with managing weight stigma (9-12), they also tend to undercut weight loss due to peer body mass. Thus, our findings may help explain unsuccessful weight loss attempts in the population.

Gains and losses of even a single social tie with a thinner or heavier individual show important links to probability of obesity (as shown in Figure 1). Motivated network changes, when aggregated over several social ties or several hundred social interactions, bear important associations with body mass change. While this study focuses on an individual's close network ties, broader social contacts also may influence one's body mass. Although the Gallup Web-based panel over-represents individuals with higher SES, it offers a viable first

set of United States estimates for longitudinal network changes among those desiring to lose weight.

Future research should investigate the mechanisms behind these longitudinal associations. For instance, increases in contact with heavier individuals may in part reflect joining a weight loss group, which may then elicit changes in eating or exercise (5). Also, the desire to lose weight is itself linked to a variety of other health traits such as smoking status and type A personality (4,20). In sum, our findings demonstrate an important mismatch between motivated and effective interpersonal strategies for weight loss. Interventions may be more successful through compensating for any counterproductive changes in personal social networks. O

Acknowledgment

Thanks to the Human Nature Lab (Yale Institute for Network Science) and to Noli Brazil, Shai Dromi, Tom Lyttelton, Candas Pinar, and Sam Stabler for their useful feedback on earlier drafts.

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