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Obesity

Self-Comparisons as Motivators for Healthy Behavior

Holly B. Shakya[1], Nicholas A. Christakis[2], and James H. Fowler[1,3]

Objective: We explored whether individuals' comparison of themselves to their social contacts, specifically feeling fitter or thinner than friends, is a significant predictor of three weight-loss behaviors (dieting, reducing alcohol, exercising).

Methods: We used a longitudinal survey of a national sample of Americans ($N = 20,373$) to measure respondents' personal social networks and their self-comparisons to their social contacts at two annual waves.

Results: Participants who felt thinner than friends in Wave 1 had 1.16 lower odds of dieting in Wave 2. Those who felt fitter than friends in Wave 1 had 1.10 times higher odds of reducing alcohol and 1.18 times higher odds of exercising in Wave 2. We found that 20% of the relationship between feeling thin at baseline and subsequent dieting may be because feeling heavier than friends makes one want to lose weight. This same dynamic accounts for 25% of the relationship between feeling fit and dieting and 12% of the relationship between feeling thin and reducing alcohol.

Conclusions: These results suggest that normative self-comparison with important others is a potentially salient determinant of obesity-related health behavior and appears to work differently depending upon the behavior. Interventions may benefit from exploiting social comparisons in targeted ways.

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Introduction

Recent work on health and social networks suggests that the social environment plays an important role in the obesity epidemic; however, the mechanisms by which these effects occur are still opaque (1-3). On one hand, there is evidence of a contagion effect, by which the behavior of one person influences social contacts to adopt that same behavior (4-7). For instance, Leahey and coworkers found that the weight-loss behavior of social contacts significantly predicted weight-loss intentions among young adults with overweight and obesity (8). On the other hand, although much research points to a straightforward social contagion dynamic for both dieting and exercise, there is also evidence of a broader and more complex dynamic driven by normative social comparison.

Previous research has demonstrated that individuals gauge their own body size in comparison with people around them (2). A person's perception of her own weight status (particularly being "overweight") is often determined by the degree to which she conforms to the norm of a social group (9,10). A social norms perspective on behavior change considers the choices of individuals to be significantly affected by the behaviors and/or opinions of those in their salient *reference groups* (11,12), or the people to whom they look for expectations regarding their own behavior (12). Merely observing others' behavior can motivate individual change in a process whereby people consciously or unconsciously comply with *descriptive norms* (13,14). Descriptive norms are prevalent behaviors that can be observed (or their results can be observed) within a community (15,16). These are differentiated from injunctive norms, which are socially reinforced through various forms of approval or disapproval.

In the case of body size, *a descriptive norms effect* can work through direct comparison so that a person compares himself to others in his social reference group and makes decisions regarding his own status according to that metric (17). Normative comparison, therefore, involves self-judgment, and, within that context, people may judge themselves to be either superior or inferior to others. This dynamic has been shown to motivate changes in behaviors as diverse as saving energy and consuming alcohol (18,19). Burke and coworkers argue that this mechanism has led to a slow upwards creep in obesity over the last decade (9). Recent work has shown that, over the last decade, increasing numbers of

[1] Family Medicine and Public Health, School of Medicine, University of California San Diego, San Diego, California, USA. Correspondence: Holly B. Shakya (hshakya@ucsd.edu) [2] Department of Sociology, Yale University, New Haven, Connecticut, USA. [3] Department of Political Science, University of California San Diego, San Diego, California, USA.

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overweight people perceive themselves as being at a healthy weight (9,20). The most likely explanation is that, as the average weight of people increases, norms regarding what is an acceptable weight shift upwards. This occurs as overweight people, comparing themselves to others around them, find that their own weight seems in line with those around them. In the case of body size comparison, therefore, what spreads between people is not just the acceptability of a certain behavior (i.e., "I diet because others diet"), but the acceptability of the outcome that is the anticipated result of that behavior (i.e., "seeing that I am heavier than my friends, I decide that I am overweight and so decide to diet"). Whether or not a person wants to lose weight or gain weight can be a function of how heavy or thin she believes she is compared to others in her reference group (21-23), and comparing one's body size adversely to one's peers has been shown to directly motivate dieting behavior (21,24). Self-comparison, then, becomes the mechanism by which norms are shifted and maintained.

Social effects around exercise behaviors, however, may be more complex. Physical activity often involves the development and maintenance of specific skills. While the exercising behaviors of social contacts are a significant predictor of individual exercise behavior (25), other work has shown that self-esteem around exercise may be equally important, and can be affected both by the feedback received from social contacts as well as direct comparison with them. For example, a study on children in France showed that group-level improvement in gymnastics skills can significantly dampen individual self-esteem around those same skills (26). Chanal and coworkers showed that positive feedback around exercise skills from social contacts significantly predicts exercise behavior, while negative feedback has a potentially dampening effect (27).

In this study, we explored whether or not individuals' comparison of themselves to their social contacts is a significant predictor of weight-loss behaviors, namely dieting, exercising, and reducing alcohol. We hypothesized that when individuals believe that they are thinner or fitter than their friends, they will be less likely to diet, reduce alcohol, or initiate exercise, as normative reference will assure them that their weight is satisfactory compared to others, even when accounting for their actual BMI.

Methods

Data

We developed a social network survey instrument for deployment with Gallup's ongoing, longitudinal, probability-based panel of American households (See Supporting Information Methods). The first wave collected data from a sample of 20,373 respondents, the second wave collected data from 27,879 respondents a year later, and a total of 13,677 were represented in both waves.

Measures

Network measures. Participants, termed here egos, were asked to name up to four alters with whom they discuss important matters and up to four individuals, termed here alters, with whom they spend their free time, so that each participant could name up to a total of eight individuals. The total number of alters named is called *degree*, and it indicates how connected the ego is to the rest of the network.

Outcome measures: health behaviors. We analyzed 3 separate outcome behaviors. Participants were asked to note whether or not in the last 3 months they had (1) gone on a weight-loss diet (2) cut back on alcohol consumption, or (3) exercised regularly (at least three times a week). Response options were: yes with someone else, yes alone, or no. We created binary variable responses for yes (either alone or with a friend) or no.

Main predictors: self-comparison measures. Our main predictors were three separate network measures that asked the participants to compare themselves with their nominated alters. While many studies focusing on social comparison use a general measure of a person's inclination towards comparing themselves to others, here we have direct comparisons between each respondent and each nominated alter on specific attributes. Respondents were asked to compare themselves to each of their alters on a 5 point scale on three separate measures: "thinness," "fitness," and "number of friends" (1 = alter superior to ego: "fitter," "thinner," "more friends," 3 = "about the same," 5 = ego superior to alter: "fitter," "thinner," "more friends"). For each of these comparisons, we aggregated all alter measures for each ego by taking the mean value to indicate how the ego compared herself to her average friend.

Control variables. Participants were asked to provide their weight and height from which we calculated a continuous measure of BMI (28).We included participant BMI, desire to lose weight (binary), income, education, age, sex, and Hispanic ethnicity (See Supporting Information Methods).

Statistical analyses

We conducted separate prospective logistic regression analyses for each of our three health behavior outcomes (dieting, reducing alcohol, and exercising) with each of our primary self-comparison predictors ("see-self-thin," "see-self-fit," and "see-self-friendly").

We first conducted a series of prospective bivariate analyses exploring the unconditional relationship of each relevant predictor with each health behavior outcome. Subsequent models assessed Wave 2 health behavior outcomes as a function of Wave 1 self-comparison measures, conditional on Wave 1 health behavior plus our control variables (See Supporting Information Methods).

Results

Table 1 shows unweighted summary statistics for our sample respondents. 52% of respondents reported regularly exercising in Wave 1, while 29% reported recently starting a diet, and 16% reduced alcohol. Overall, respondents felt slightly heavier, slightly less fit, and significantly less popular than their friends, possibly reflecting a known attribute of social networks that nominated individuals tend be higher in social status than those who have nominated them (29). Mean respondent BMI was 27.7, which is somewhat lower than age-adjusted national estimates of 28.7 (30), with 74% of respondents wanting to lose weight. Bivariate analyses are shown in Table 2.

TABLE 1 Summary statistics for Gallup Internet social networks study respondents (non-weighted)

	Wave 1	Wave 2
Exercise regularly last 3 months, % (yes)	52%	51%
Started diet within last 3 months, % (yes)	29%	27%
Quit alcohol within last 3 months, % (yes)	16%	16%
Self-thin, mean (scale 1–5)	2.78 (SD 0.88)	2.79 (SD 0.89)
Self-fit, mean (scale 1–5)	2.89 (SD 0.83)	2.88 (SD 0.85)
Self-friendly, mean (scale 1–5)	2.34 (SD 0.79)	2.33 (SD 0.81)
BMI, mean	27.77 (SD 5.97)	27.81 (SD 6.00)
Want to lose weight, % (yes)	74%	73%
Degree (range 1–8)	3.95 (SD 1.99)	3.99 (SD 1.99)
Sex, % (female)	51	
Age, mean	57.18 (SD 13.97)	
Education, mean (scale 1–7)	5.65 (SD 1.43)	
Income, mean (scale 1–9)	5.78 (SD 1.86)	
Race		
White	88%	
Asian	1%	
Black	4%	
Other	2%	
Mixed	5%	
Hispanic ethnicity, % (yes)	6%	

Dieting behavior

The strongest predictor of dieting behavior in Wave 2 was weight-loss desire a year earlier in Wave 1 (Table 3, Supporting Information Tables S1–3). Those who reported wanting to lose weight in Wave 1 were 3.32 [95% confidence interval (CI) 2.73–4.04] times more likely to begin a diet in Wave 2, controlling for whether or not they dieted in Wave 1. BMI was also a significant predictor of dieting behavior. Each 1 standard deviation (SD) increase in Wave 1 reported BMI increased the likelihood of dieting in Wave 2 by 1.20 times (1.07, 1.35). For our self-comparison measures, perception of both see-self-thin and see-self-fit in Wave 1 significantly predicted the likelihood of dieting in Wave 2, controlling for whether or not the respondent dieted in Wave 1. The thinner or fitter a person perceived themselves to be compared to friends in Wave 1, the *less* likely they were to begin dieting in Wave 2, although this effect was far more robust for thinness than it was for fitness. Both effect sizes, however, diminished with the addition of BMI and wanting to lose weight in the model. While see-self-thin retained significance, see-self-fit did not. In the final model, each 1 SD increase in perception of own thinness decreased the odds of Wave 2 dieting by 1.16 (95% CI: 1.06–1.24): equivalent to the effect of a 5 point decrease in BMI. The effect of see-self-friendly was small and insignificant in the first model, so we did not include it in the final two models.

Reducing alcohol

As with dieting, wanting to lose weight in Wave 1 was a strongly significant predictor of reducing alcohol in Wave 2 (see Table 4, Supporting Information Tables S4–6), increasing the odds by 1.45 (95% CI: 1.19–1.76). BMI, however, had a slight but negative association with reducing alcohol. Each 1 SD increase in Wave 1 BMI decreased the chance of reducing alcohol in Wave 2 by 1.12 times (95% CI: 1.00–1.27). As for our self-comparison measures, the results with reducing alcohol showed some interesting differences compared to what we saw with dieting. While see-self-thin showed a negative relationship with reducing alcohol that diminished upon inclusion of wanting to lose weight, see-self-fit showed an opposite dynamic. The fitter that one was compared to one's friends in Wave 1, the more likely one was to quit alcohol by Wave 2. Furthermore, this relationship did not diminish upon inclusion of wanting to lose weight in the model. Each one SD increase in self-fitness in Wave 1 boosted the odds of reducing alcohol in Wave 2 by 1.10 (95% CI: 1.01–1.19), an equivalent change in odds to losing 4.5 points of BMI. As with dieting, see-self-friendly had no impact on the odds of reducing alcohol.

Exercising

Unlike what we observed with the other two health behaviors, wanting to lose weight in Wave 1 was only marginally related to exercising behavior in Wave 2 (see Table 5, Supporting Information Tables S7–9). Consistent with the results we saw with reducing alcohol,

TABLE 2 Bivariate prospective models showing the relationship between main network- and individual-level predictors and health behavior outcomes[a]

	Diet within the last 3 months			Quit alcohol within the last 3 months			Regular exercise in the last 3 months		
	Beta	SE	P	Beta	SE	P	Beta	SE	P
Self-thin	−0.46	0.02	0.00	−0.09	0.03	0.00	0.18	0.02	0.00
Self-fit	−0.27	0.03	0.00	0.05	0.03	0.11	0.38	0.02	0.00
Self-friendly	0.09	0.03	0.00	0.05	0.03	0.14	0.12	0.02	0.00
Want to lose weight	1.86	0.07	0.00	0.48	0.06	0.00	−0.12	0.04	0.01
BMI	0.09	0.00	0.00	0.01	0.00	0.01	−0.03	0.00	0.00
Degree	0.03	0.01	0.00	0.03	0.01	0.03	0.07	0.01	0.00

[a]All bivariate models include Wave 1 sampling weights.

TABLE 3 Prospective models showing the association between Wave 1 own values compared to friends on Wave 2 dieting in last 3 months, controlling for Wave 1 dieting in last 3 months[a]

	Model 1			Model 2			Model 3		
	B	SE	P	B	SE	P	B	SE	P
		N 10394			**N 10260**			**N 10231**	
Self-thin	−0.41	0.03	0.00	−0.26	0.04	0.00	−0.17	0.04	0.00
Want to lose weight							1.20	0.10	0.00
BMI				0.05	0.01	0.00	0.03	0.01	0.00
Degree	0.02	0.02	0.24	0.03	0.02	0.18	0.03	0.02	0.17
		AIC 7194			AIC 6927			AIC 6767	
		N 10578			**N 10264**			**N 10235**	
Self-fit	−0.22	0.03	0.00	−0.09	0.04	0.01	−0.06	0.04	0.09
Want to lose weight							1.26	0.10	0.00
BMI				0.06	0.01	0.00	0.04	0.01	0.00
Degree	0.02	0.02	0.20	0.03	0.02	0.14	0.03	0.02	0.14
		AIC 7274			AIC 6945			AIC 6765	
		N 10394							
Self-friendly	0.05	0.04	0.20						
Want to lose weight									
BMI									
Degree	0.01	0.02	0.58						
		AIC 7216							

[a]All models include Wave 1 dieting, sex, age, education, income, race, ethnicity, geographic fixed effects, and Wave 1 sampling weights (full models shown in Supporting Information Tables S1–3).

TABLE 4 Prospective models showing the association between Wave 1 own values compared to friends on Wave 2 alcohol in last 3 months, controlling for Wave 1 alcohol in last 3 months[a]

	Model 1			Model 2			Model 3		
	B	SE	P	B	SE	P	B	SE	P
		N 9582			**N 9314**			**N 9289**	
Self-thin	−0.03	0.04	0.49	−0.08	0.05	0.09	−0.04	0.05	0.39
Want to lose weight							0.37	0.10	0.00
BMI				−0.02	0.01	0.03	−0.02	0.01	0.00
Degree	0.04	0.02	0.08	0.04	0.02	0.11	0.04	0.02	0.10
		AIC 5030			AIC 4943			AIC 4922	
		N 9588			**N 9318**			**N 9293**	
Self-fit	0.11	0.04	0.01	0.09	0.05	0.05	0.11	0.05	0.02
Want to lose weight							0.40	0.10	0.00
BMI				−0.01	0.01	0.36	−0.02	0.01	0.01
Degree	0.04	0.02	0.09	0.04	0.02	0.11	0.04	0.02	0.12
		AIC 5020			AIC 4939			AIC 4915	
		N 9427							
Self-friendly	−0.01	0.05	0.88						
Want to lose weight									
BMI									
Degree	0.05	0.02	0.06						
		AIC = 4972							

[a]All models include Wave 1 dieting, sex, age, education, income, race, ethnicity, geographic fixed effects, and Wave 1 sampling weights (full models shown in Supporting Information Tables S4–6).

TABLE 5 Prospective models showing the association between Wave 1 own values compared to friends on Wave 2 exercising in last 3 months, controlling for Wave 1 exercising in last 3 months[a]

	Model 1			Model 2			Model 3		
	B	SE	P	B	SE	P	B	SE	P
		N 10480			**N 10165**				
Self-thin	0.13	0.03	0.00	0.02	0.04	0.58			
Want to lose weight									
BMI				−0.03	0.01	0.00			
Degree	0.06	0.02	0.00	0.05	0.02	0.00			
		AIC 7807			AIC 7576				
		N 10489			**N 10165**			**N 10142**	
Self-fit	0.27	0.03	0.00	0.19	0.04	0.00	0.20	0.04	0.00
Want to lose weight							0.14	0.07	0.05
BMI				−0.03	0.00	0.00	−0.03	0.01	0.00
Degree	0.06	0.02	0.00	0.06	0.02	0.00	0.06	0.02	0.00
		AIC 7758			AIC 7543			AIC 7505	
		N 10164			**N 9993**			**N 9965**	
Self-friendly	0.09	0.04	0.01	0.09	0.04	0.02	0.08	0.04	0.02
Want to lose weight							0.11	0.07	0.14
BMI				−0.03	0.00	0.00	−0.04	0.01	0.00
Degree	0.04	0.02	0.03	0.04	0.02	0.06	0.04	0.02	0.05
		AIC 7668			AIC 7428			AIC 7393	

[a]All models include Wave 1 dieting, sex, age, education, income, race, ethnicity, geographic fixed effects, and Wave 1 sampling weights (full models shown in Supporting Information Tables S7–9).

Wave 1 BMI was inversely associated with Wave 2 exercising. Each 1 SD increase in BMI was associated with a 1.20 times (95% CI: 1.06–1.35) *reduced* odds of exercising in Wave 2. Our self-comparison measures again differed from what we saw with our previous two outcomes. While see-self-thin significantly predicted exercising in the first model, it became insignificant in model 2 with the inclusion of BMI. See-self-fit, however, remained a significant predictor of exercising in all three models, with no decrease in effect with the inclusion of BMI and wanting to lose weight. Furthermore, as with reducing alcohol, the impact of see-self-fit on exercising was the opposite of the effect we saw with dieting. The fitter ego felt compared to his or her friends in Wave 1, the more likely ego was to exercise in Wave 2, controlling for ego's exercising behavior in Wave 1. Each 1 SD increase in feeling fitter than one's friends in Wave 1 increased the odds of exercising in

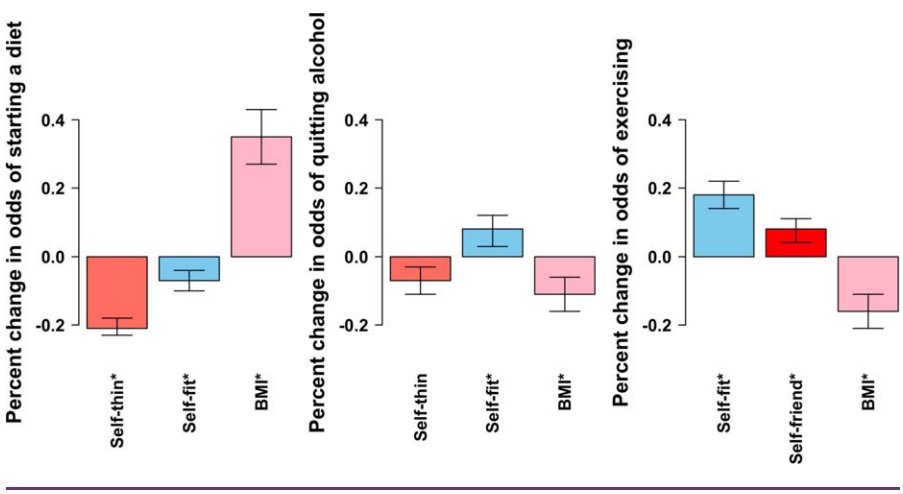

Figure 1 Percent of change in odds of starting a diet, reducing alcohol, and exercising with a 1 SD increase in see-self-thin, see-self-fit, see-self-friendly, and BMI. Models are pre-mediation and include all demographic controls including geographic fixed effects. Error lines show standard error of the mean. *Significant at 0.05 or below. [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]

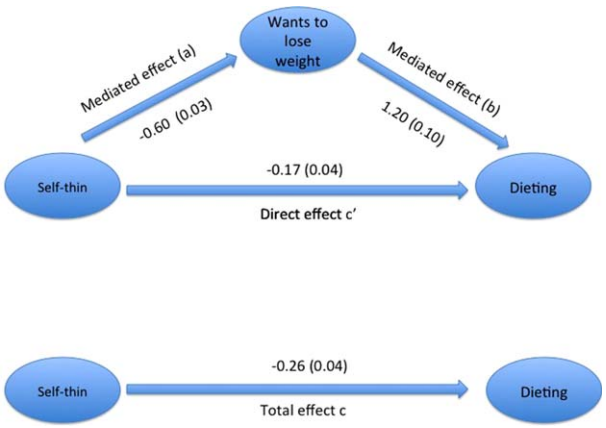

Figure 2 The mediation model. The primary question is whether the mediation path (ab) accounts for any of the total effect, in this case the association between the respondent's measure of thinness compared to friends and starting a diet. When mediation occurs, we should expect that the direct effect diminishes or disappears compared to the total effect with the inclusion of the mediating variable, in this analysis wanting to lose weight. [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]

Wave 2 by 1.18 times (95% CI: 1.11–1.26), equivalent to the magnitude of wanting to lose weight, or a decrease in 5.5 BMI points.

To further explore this dynamic, we stratified our model in two subsets: those who had been regular exercisers in Wave 1 and those who had not (See Supporting Information Table S10). The results show that perception of self-fitness compared to friends significantly predicted exercise behavior in both groups.

Finally while feeling more popular than your friends was not significantly related to dieting or reducing alcohol, Wave 1 see-self-friendly was significantly related to the odds of exercising in Wave 2. For each 1 SD increase in see-self-friendly, the odds of exercising increased by 1.06 times (95% CI: 1.00–1.14).

Overall, Figure 1 shows the change in the likelihood of engaging in a health behavior given a 1 SD increase in see-self-thin, see-self-fit, and see-self-friendly, as well as BMI.

Social cohesion analysis

We ran a final set of models in which we calculated a score of Wave 1 network cohesion for each individual (see Supporting Information Methods), and then stratified the analyses by above and below the median network cohesion score. While most of our models suggested cohesion was not a significant moderator, we found that the relationship between dieting and fitness was significant for those above the median network cohesion score but not for those below, while the relationship between exercise and fitness was significant for those below the median network cohesion score but not for those above (see Supporting Information Tables S11–12) .

Mediation analysis

The effects of both see-self-thin and see-self-fit on dieting, as well as the effect of see-self-thin on reducing alcohol, were attenuated by the addition of wanting to lose weight, suggesting a possible mediation effect. Figure 2 illustrates the relationship between see-self-thin and dieting, mediated by wanting to lose weight. To understand whether this dynamic occurred as part of a possible causal pathway, we tested those 3 prospective models for mediation, using the mediation package in R, which estimates the average causal mediation effect (ACME) (31,32). (For more details see Supporting Information Methods). The results of our analyses (Supporting Information Tables S13:15) showed possible mediation for all three analyses. The results suggest that 20% of the relationship between see-self-thin and dieting may be explained by the fact that feeling less thin than one's friends makes one want to lose weight. This same dynamic accounts for 25% of the relationship between see-self-fit and dieting, and 12% of the relationship between see-self-thin and reducing alcohol.

We ran additional analyses to consider whether proportion of alters that were the same gender as the respondent moderated our results. The results were negative (not shown).

Discussion

In this study, we used a nationally representative longitudinal dataset to test the degree to which normative self-comparison influences the likelihood that a person engages in weight-related health behaviors—namely dieting, exercising, and reducing alcohol. Consistent with our hypothesis, we found that when people judged themselves to be superior to their friends (in this case thinner or fitter), they were less likely to diet, similar to prior findings that perceiving oneself as heavier than friends is a strong motivator for diet-focused weight loss (21,33). This held for both perception of weight as well as perception of fitness. Hence, for dieting, downwards social comparison is salient for inaction, while upwards social comparison is salient for action. This is consistent with previous research suggesting that, as the average weight of the overall population increases, the weight which people believe is acceptable for themselves increases as well (9,20). In this study, we have direct evidence that this phenomenon occurs within the context of a person's closest personal relationships.

Contrary to our hypothesis, we found that the dynamics around exercising are quite different than those around dieting. First, while those with high BMIs in Wave 1 were likely to start dieting in Wave 2, the opposite was the case for exercise. Furthermore, desire for weight loss was only moderately associated with exercising, and perception of self-thinness compared to friends was not significantly related to exercising at all. On the other hand, perception of self-fitness compared to friends was strongly associated with exercising behavior and in the opposite direction of what we found with dieting. People who believed that they were less fit than their friends in Wave 1 were *less* likely to exercise in Wave 2. Conversely the fitter people believed that they were compared to their friends in Wave 1, the more likely they were to exercise in Wave 2. Hence for exercise, it seems that downwards social comparison is salient for action, while upwards social comparison is salient for inaction. We also found that, while feeling popular compared to friends had no relation to dieting behavior, it was significantly related to exercising. This suggests that overall self-esteem might be important for exercising, beyond perceptions specific to exercise such as fitness.

Our results strongly support a normative explanation behind obesity in terms of eating behaviors. Because people are assessing their own weight in comparison to others, as the average weight of those

around them inches upwards, their own eating behavior shifts accordingly. As long as they perceive themselves to be in the range of those around them, they are less likely to restrict their own eating, *regardless of their own BMI*. Their behavior therefore works towards the goal of adapting to the norm of those in their reference group. In norms interventions research, this dynamic has been termed *the boomerang effect,* which occurs when people become more likely to increase an unhealthy behavior after learning that they are below the level of what may be an unhealthy norm (19).

The dynamics around exercising, however, appear very different. Because exercise requires skill to accomplish, people may possibly be assessing themselves according to those skills (or the markers of those skills, such as fitness), and therefore losing motivation if they feel that they do not measure up. Rather than trying to adapt to the norms of the reference group of exercisers, those who feel that they cannot live up to those norms may, we speculate, simply quit the group (or refrain from becoming a part of the group to begin with). These results are further strengthened by our investigation of network cohesion, which shows that the associations for exercise and fitness are driven by people in less cohesive networks, while the associations for dieting and fitness are driven by people in more cohesive networks. As within-group cooperation and normative reinforcement is more likely in cohesive networks (34,35), this suggests that the dampening impact of upwards self-comparison for exercise is likely occurring in more competitive, less cooperative contexts, while the dampening impact of downwards self-comparison for dieting is likely occurring in less competitive, more normatively driven, cooperative contexts.

Finally, our results around reducing alcohol add an interesting dimension to these findings. As with exercise, we found that a self-perception of fitness was associated with reducing alcohol. The fitter a person felt in Wave 1, the more likely they were to quit alcohol in Wave 2. These results suggest that fitness as a self-concept may be a promising motivator in terms of promoting healthy behavior. Individuals who believe that they are fitter than others were still less likely to diet. However, this may be because their baseline diet was better to begin with as "dieting" has a connotation of reducing food consumption that may have been initially excessive. More importantly, perhaps those who feel fitter than friends are more likely to exercise and quit alcohol, both important behaviors for promoting long term health.

One weakness of this study is that, while we know through self-report measures whether or not a person started a diet or reduced alcohol within the last 3 months before the survey, we do not know what their baseline diet and alcohol consumptions patterns actually were. Furthermore, because we do not have full social network data, we do not have direct measures of the behaviors and attitudes in the nominated social contacts. Further work should attempt to replicate these measures using full (sociocentric) network data in which there are complete health and behavioral measures on both naming and named contacts. Also we do not know how the individuals in question interpreted dieting and exercise, so we cannot assess whether these behaviors met current guidelines, and were health-promoting overall. Finally, direct measures of alters' BMI and fitness would certainly add to the strength of these analyses. Even with such data, however, it can be very difficult to isolate peer influence because similar individuals tend to befriend each other (36,37). What is unique in our data, is the precise enumeration of ego's friends at two waves, and the ability to average ego's *own perception* of body image and fitness across each of those friends.

Despite these weaknesses, this study is unique in that we have respondents' direct measures of self-comparison for each of the social contacts that they nominated. This provides compelling evidence that individuals are making health behavior decisions based in part on these comparisons, and these decisions differ according to the type of comparison and the behavior in question.

An important implication of these diverse results for diet, alcohol, and exercise is that different kinds of social interventions may be needed to promote healthy behavior in each domain. In fact, a norms-based intervention designed to help people compare their health to healthy friends may yield good results for diet-focused weight loss but bad results for promoting exercise! As a next step, we hope experiments might explore the effect of highlighting, for individuals, various comparisons with their friends in order to see if they work in the same direction this observational study suggests. O

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