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Weight and weight control behaviors of Latinas and their social ties

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Abstract

Objective—Shared behaviors have been implicated in the clustering of obesity among socially connected people. This study determined how weight and weight control behaviors of participants and their social ties are related and how these factors are associated with weight change in participants.

Methods—Adult Latinas participating in a lifestyle intervention completed an egocentric network measure of weight and weight control behaviors. Participant weight was objectively measured at baseline and 12 months. Multivariable regression models determined the relationship between weight and weight control behaviors of participants and their social ties.

Results—Participants and their social ties shared similarities in weight control behaviors and weight change. Participants who reported social ties that had lost weight were more likely to eat small portions and low fat foods but those with social ties that had gained weight were more likely to use herbal supplements. Participants who reported more social ties who exercised, drank liquid meal replacements, took herbal supplements, and self-weighed were more likely to lose weight whereas those with fewer social ties that exercised were more likely to gain weight. Weight loss and weight gain by social ties predicted participant weight loss and weight gain, respectively.

Conclusions—Given that weight and weight control behaviors of Latinas reflect that of their social ties, targeting existing social networks for lifestyle interventions may more effectively improve and sustain health promoting behaviors and outcomes.

Keywords

Latina; social ties; weight control behaviors

Weight and weight control behaviors of Latinas and their social ties have high prevalence of obesity (Flegal, Carroll, Kit, & Ogden, 2012) but are less likely to use recommended diet and exercise strategies to manage weight compared to non-Hispanic Whites (Baradel et al., 2009; Kruger, Galuska, Serdula, & Jones, 2004). Studies on mostly non-Hispanic Whites have implicated social ties in influencing one's body weight (Christakis & Fowler, 2007; Cobb et al., 2016; Henning et al., 2014; Hruschka, Brewis, Wutich, & Morin, 2011; Leroux,

Moore, Richard, & Gauvin, 2012). Essentially, social ties serve as sources of exposure that can impact one's weight and weight control behaviors. The purpose of the present study is to determine how weight and weight control behaviors of Latinas participating in a lifestyle intervention and their social ties are related and how these factors are associated with weight change in participants.

Social ties and weight status

Social clustering of obesity has been reported in several studies. Individuals with overweight and obesity have more social ties that are overweight compared to individuals that are normal weight (Leahey, Gokee LaRose, Fava, & Wing, 2011). Women are more likely to be obese when they have close family members with obesity (Hruschka et al., 2011). There is evidence to suggest that spouses, siblings, and friends become more alike in weight status overtime, and these relationships extend to friends of friends and even friends of friends of friends (Christakis & Fowler, 2007; Fowler & Christakis, 2008). Social norms and shared activities related to eating or physical activity have been proposed as possible mechanisms for the clustering of obesity in social networks (Cobb et al., 2016; Jackson, Steptoe, & Wardle, 2015).

Social ties and weight control behaviors

Weight-related behaviors are similar among socially connected adults. Exercise and eating behaviors of family and friends are positively associated (Barclay, Edling, & Rydgren, 2013; Pachucki, Jacques, & Christakis, 2011). Spouses are especially concordant on diet such as the consumption of fat (Macken, Yates, & Blancher, 2000). Several studies have found that adoption of dietary behaviors and physical activity by one family member predict similar changes in other family members (Cobb et al., 2016; Golan, Schwarzfuchs, Stampfer, & Shai, 2010; Jackson et al., 2015; Shattuck, White, & Kristal, 1992). Women who report family or friends dieting, using diet pills, or vomiting for weight loss are more likely to engage in the same behaviors, suggesting that weight loss methods are also shared among social ties (Breitkopf & Berenson, 2004).

Social ties and weight change

Weight status and weight change in social ties predict weight change in individuals. One study of individuals in a behavioral weight loss trial found that greater weight loss was associated with having fewer overweight friends (Leahey, Doyle, Xu, Bihuniak, & Wing, 2015). Meanwhile, a nationwide longitudinal study showed that people who felt heavier than their friends were more likely to diet in the future, at least partly because social comparison made them want to lose weight (Shakya, Christakis, & Fowler, 2015). Another study found that normal and overweight individuals who had higher contact with thinner social ties lost weight whereas those who had higher contact with heavier social ties gained weight after one year (Andersson & Christakis, 2016). Longitudinal studies of married couples reveal that a spouse experiences weight gain or weight loss when their partner has previously done so, thereby increasing concordance on weight status (Christakis & Fowler, 2007; Cobb et al., 2016; Fowler & Christakis, 2008; Jackson et al., 2015; Macken et al., 2000). Spouses of

participants of a weight loss program have also been shown to lose weight despite not being directly exposed to the intervention but likely through transmission of dietary behaviors (Gorin et al., 2008).

Present study

Based on past research indicating social influences on weight and weight-related behaviors, this study examined weight and weight control behaviors of participants in a one year lifestyle intervention for Latinas. This study hypothesized: 1) Weight and weight control behaviors will be similar between participants and their social ties 2) A greater proportion of social ties that are normal weight, engage in weight control behaviors, or experience weight loss will be associated with weight loss in participants 3) A greater proportion of social ties that are overweight, do not engage in weight control behaviors, or experience weight gain will be associated with weight gain in participants.

Method

Design

Participants were adult Latinas enrolled in a 12 month randomized controlled trial (NCT 01834287) that compared the efficacy of two internet-based interventions (Marcus et al., 2015). The physical activity intervention group received information on physical activity. The wellness control group received information on various heart health topics such as eating low sodium foods, but did not include physical activity. Neither intervention group focused on weight management. The main outcome of the randomized controlled trial was minutes per week of moderate-to-vigorous physical activity (Marcus et al., 2016).

Participants

Participants were women who resided in San Diego County. To be eligible for the study, participants were required to be female, self-identify as Hispanic/Latino, be 18 to 65 years old, have a body mass index (BMI) of 18–45 kg/m², have internet access, and not engage in more than 60 minutes per week of at least moderate intensity physical activity. The study was approved by the University of California San Diego Institutional Review Board, and all participants provided written informed consent.

Measures

Participant baseline characteristics—Demographic data were collected via a self-administered questionnaire at the baseline visit. Participants provided information on age, education, and marital or cohabitation status. BMI was calculated in kg/m² from objectively measured height and weight.

Social ties characteristics—Egocentric network data were collected from participants at the 12 month visit via a face-to-face interview conducted in Spanish or English. Data were collected using a name generator where the participant provided names of people with whom she discussed important matters in the past year (Marsden, 1987). Participants were asked to provide the name of people in the order of extent to which they felt the most to least

close. Information was collected for each social tie such as age, gender, ethnicity, relationship type, and residence status. Additional questions were asked about weight, weight change, and weight control behaviors of the primary three social ties (first three people listed).

Social ties weight status and weight change—Participants were asked to report the weight status and weight change of each social tie. Participants were asked, “How would you describe the current body weight of ___?” Options were: underweight, normal weight, and overweight. Participants were also asked, “How would you describe the change in weight during the past year of ___?” Options were: weight did not change much, lost weight, gained weight, and gained weight because of pregnancy. Only responses for weight loss and weight gain (non-pregnancy) were examined.

Social ties weight control behaviors—Participants were asked to report the weight control behaviors over the past year of each social tie. Participants were asked, “How often does ___ do the following weight control activities?” The weight control behaviors assessed were based on an adapted version of the National Health Examination Survey (2007–2012) Weight History Questionnaire (Marquez & Murillo, 2017; Marquez, Ayala, & Wing, 2015). Items were: eat a special diet to lose weight; eat small portions; eat low calorie meals; drink liquid meal shakes; eat frozen low calorie meals; eat meal replacement bars; wear a weight loss girdle; take herbal supplements; drink herbal tea; take weight loss or diet pills; fast or skip meals; join a commercial weight loss program; smoke cigarettes; weigh self on scale; record food and beverages consumed or count calories; exercise to lose weight. Responses were dichotomized into never/rarely and some of the time/most of the time/always.

Participant weight, weight change, and weight control behaviors—Participant weight was objectively measured at 12 months. Weight status was determined by standard BMI categories (NHLBI, 1998). Weight change was determined by the difference in body weight at 12 months and baseline divided by baseline weight. Weight change was assessed categorically as a no/yes dichotomous variable and continuously as percent weight change. Participant weight control behaviors were determined by self-report as described for social ties.

Analysis

Data were analyzed for 107 participants and their primary three social ties. Descriptive statistics summarized participant baseline characteristics. Similarities among participants and their social ties on weight, weight change, and weight control behaviors were measured using the intraclass correlation coefficient (ICC).

Multivariable analyses controlled for study group and participant baseline BMI and characteristics (age, education, and marital status). Logistic regression models tested the association of proportion of social ties that were normal or overweight, engaged in weight control behaviors, and experienced weight loss or weight gain with participant weight status, weight control behaviors, and weight change. Linear regression models tested the association of proportion of social ties that were normal or overweight with the number of

weight control behaviors performed by the participant as well as the association of proportion of social ties that experienced weight loss or weight gain with participant percent weight loss or weight gain. Statistical analyses were performed using PASW Statistics 21 (©SPSS, Chicago, IL).

Results

Participant characteristics

The baseline characteristics of the study sample are presented in Table 1. Participants had an average age of 40 ± 10 years. The majority of participants were Mexican-American (85%), had at least a high school education (84%), and were married (63%). The average participant BMI was in the overweight category.

Social ties characteristics

The primary three social ties were on average 41 ± 10 years old. Participants were connected to females (62%), Latinos (89%), and family members (69%). Family members were mostly adult children, spouse, and siblings. About a third (32%) of social ties resided with participants.

Participant and social ties weight status and change

Most participants were overweight at 12 months (Table 2). Specifically, 22.4% were normal weight and 77.6% were overweight (39.3% overweight and 38.3% obese). Those that gained weight had a mean weight gain of 3.6%. Those that lost weight had a mean weight loss of 3.2%. About 38.0% and 20.0% of participants lost 3% and 5% of baseline body weight, respectively.

Participants reported the weight status of their social ties as 8.9% underweight, 45.7% normal weight, and 45.4% overweight (Table 2). Weight changes were also reported for social ties as 32.8% losing weight and 15.5% gaining weight. Participants and their social ties were similar in weight change (ICC range 0.31–0.33, $p < 0.05$) but not in weight status (ICC range 0.09–0.11, $p > 0.05$).

Participant and social ties weight control behaviors

Participants engaged in various weight control behaviors in the past year (Table 3). The majority of participants used dietary strategies (i.e. controlling fat, calories, and portions), exercise, and self-weighing. Almost half of participants used a special diet or meal replacement bars and a third counted calories. Less commonly used strategies included drinking herbal teas, drinking liquid shakes, wearing a weight loss girdle, taking herbal supplements, eating frozen prepackaged meals, fasting, smoking cigarettes, taking laxatives, joining a weight loss program, and taking diet pills.

Weight control behaviors were similar among participants and their social ties (Table 3). According to the ICC estimates, there were small to moderate resemblances in weight control behaviors (ICC range 0.25–0.67, $p < 0.05$) except for eating a special diet, eating small portions, and taking dieting pills (ICC range 0.13–0.19, $p > 0.05$). Multivariable models

showed that use of weight control strategies by social ties significantly predicted use by participants. Only use of special diet, small portions, and girdle were not related between participants and their social ties. Due to very low use of diet pills, laxatives, and weight loss programs, these models were not conducted.

Reporting more normal weight social ties was associated with participants engaging in less weight control behaviors ($\beta=-0.184$, S.E.=0.080, $p=0.024$). There was also some suggestion of an association between reporting more overweight social ties and participants engaging in more weight control behaviors ($\beta=0.156$, S.E.=0.081, $p=0.056$). Participants who reported normal weight social ties were less likely to use a special diet, small portions, herbal supplements and teas, and self-weighing (Table 4). Participants who reported overweight social ties tended to be more likely to use small portions ($p=0.059$), low fat foods ($p=0.057$), and herbal teas ($p=0.052$). Participants who reported more social ties that had lost weight were more likely to eat small portions and low fat foods but less likely to smoke cigarettes. Participants with more social ties that had gained weight were more likely to use herbal supplements.

Predictors of participant weight change

Weight control behaviors of participants and their social ties were associated with weight change in participants (Table 5). Participants who reported eating low calorie meals (OR: 3.817, CI: 1.288–11.313, $p=0.016$) and low fat foods (OR: 4.254, CI: 1.196–15.129, $p=0.025$) were more likely to lose weight. Similarly, participants who reported eating low calorie meals were less likely to gain weight (OR: 0.328, CI: 0.116–0.924, $p=0.035$). Testing the combined effects of participant weight control behaviors and social ties weight control behaviors and/or weight status on participant weight change revealed that the more proximal factor of participant weight control behavior had the stronger association with participant weight change.

Participants who reported more social ties who exercised (OR: 1.209, CI: 1.062–1.376, $p=0.004$), drank liquid meal shakes (OR: 1.163, CI: 1.005–1.347, $p=0.043$), took herbal supplements (OR: 1.211, CI: 1.008–1.454, $p=0.041$), and self-weighed (OR: 1.152, CI: 1.012–1.312, $p=0.033$) were more likely to lose weight. Participants who reported fewer social ties that exercised (OR: 0.858, CI: 0.757–0.972, $p=0.016$) were more likely to gain weight.

Weight status and weight change of social ties were related to weight change in participants. Participants who reported more normal weight social ties were less likely to lose weight (OR: 0.883, CI: 0.780–0.999, $p=0.048$). No relationship was found for overweight social ties. Having more social ties that lost weight was associated with higher percent weight loss in participants ($\beta=-0.283$, S.E.=0.138, $p=0.043$) and having more social ties that gained weight was associated with higher percent weight gain in participants ($\beta=0.384$, S.E.=0.189, $p=0.045$).

Discussion

This study examined weight and weight control behaviors of Latinas and their social ties. Women and their social ties were alike in use of weight control strategies and weight change. Weight status and weight change of social ties were associated with weight control behaviors and weight change in women.

Women and their social ties were similar on a variety of weight control behaviors such as use of dietary strategies, exercise, meal replacements, non-traditional methods, and self-monitoring strategies. This finding is consistent with studies on adolescents showing that dieting behaviors of normal weight and overweight girls are predicted by the dieting behaviors of their friends (Eisenberg, Neumark-Sztainer, Story, & Perry, 2005; Hutchinson & Rapee, 2007). The women in the present study were predominately connected to other Latinas who were close family members and friends which may facilitate commonalities in behaviors because ideas and practices tend to be shared within homogeneous and dense networks (Valente, 2010). Interestingly, the majority of social ties did not reside with participants which may speak to the contribution of social proximity in comparison to geographic proximity in the spread of behaviors or norms related with weight (Christakis & Fowler, 2007). Other studies reveal that social ties are potentially prominent sources of influence on the health behaviors of Latinas (Marquez et al., 2014; Marquez, Gonzalez, Gallo, & Ji, 2016). For example, Latinas are more likely than non-Hispanic White women to report relying on health information from family and friends and taking preventive action on health based on encouragement from friends (Mochari-Greenberger, Mills, Simpson, & Mosca, 2010; Mosca et al., 2000).

Being connected to more individuals who engage in weight control behaviors may promote these behaviors in women through greater exposure to information and modeling and also by establishing a social norm within the social network. Previous studies of men and women suggest that having a large proportion of social ties or observing many others engage in physical activity or eating behaviors may make these behaviors “normative” and lead to pressure to conform (Ball, Jeffery, Abbott, McNaughton, & Crawford, 2010; Emmons, Barbeau, Guthel, Stryker, & Stoddard, 2007; Okun et al., 2003). Some groups may be particularly susceptible to social norms. For young adults, having a higher number of social ties who exercise regularly reduces the likelihood of physical inactivity (Leroux et al., 2012). Similarly, Latinas who report seeing or knowing others who exercise are more likely to be physically active (Evenson, Sarmiento, Tawney, Macon, & Ammerman, 2003).

Drawing on the idea that weight status of social ties can shape body size norms, it was hypothesized that women with more overweight social ties would use fewer weight control strategies and experience weight gain. For example, having more social ties with obesity or frequent contact with social ties with obesity is associated with having larger body size norms, and living with someone with obesity is linked to weight gain among Blacks and Latinos (Winston, Phillips, Wethington, Wells, et al., 2015; Winston, Phillips, Wethington, Devine, et al., 2015). Contrary to expectations, this study found that women who reported more normal weight social ties used fewer weight control strategies and did not lose weight. These results make sense when considering that normal weight individuals are generally less

likely than overweight individuals to intentionally try to lose weight or to prevent weight gain (Weiss, Galuska, Khan, & Serdula, 2006). Individuals who attempt to manage weight are known to use several and diverse types of strategies such as exercising, following a special diet, using meal replacement products, skipping meals, and taking supplements (Andreyeva, Long, Henderson, & Grode, 2010; Weiss et al., 2006). Hence, contact with many normal weight people may not provide the social resources needed to promote weight loss in others unless these normal weight ties engage in weight control behaviors.

This study supports the idea that weight control behaviors of social ties play an especially important role in the weight changes of women. Women who reported social ties that had lost weight were more likely to eat small portions and low fat foods but those with social ties that had gained weight were more likely to use herbal products. Moreover, women lost weight when more of their social ties exercised, drank liquid meal shakes, took herbal supplements, and self-weighed but gained weight when fewer of their social ties exercised.

The role of social ties that exercise on the weight and weight change of others has been previously reported. Individuals with social ties that exercise are less likely to be obese (Leroux et al., 2012) which may be due to comparable active lifestyles. Having friends who exercise may engender friendly competition, which can be positive since people who feel fitter than their peers are more likely to exercise in the future (Shakya et al., 2015). Another benefit to knowing others that are alike in physical activity is the presentation of opportunities to receive social support in the form of co-participation. Latinas who had family and friends join them in physical activity, engaged in more minutes per week of physical activity, and lost more weight than those without such co-participation after a year in a weight loss intervention (Marquez, Anderson, et al., 2016). Having others with whom to be active can therefore improve behavioral adherence long-term.

Although social ties were not targeted in this lifestyle intervention, their weight loss and weight gain corresponded to objectively measured weight change in study participants. Previous studies on social ties and intervention outcomes in Latinas have focused on social support. In the *Seamos Saludables* trial, family and friend social support for exercise mediated intervention effects on self-reported and objectively measured physical activity (Marquez, Dunsiger, Pekmezi, Larsen, & Marcus, 2016). In the *Small Changes and Lasting Effects* trial, Blacks and Latinos who reported receiving help from a child for diet and help from a coworker for physical activity experienced greater weight loss than those without help (Winston, Phillips, Wethington, Devine, et al., 2015). The results of the current study suggest that facilitation of weight change in intervention participants by their social ties may depend on whether or not they and their social ties engage in similar weight related behaviors. Exit interviews with Latinas in the *Seamos Saludables* trial revealed that participants believed they influenced the uptake of physical activity by family, friends, and coworkers through modeling, inclusion in activities, and sharing of intervention materials (Marquez, Dunsiger et al., 2016). This may apply to other weight related behaviors considering that Latinas are more likely than non-Latinas to report helping someone else lose weight in the past year (Mochari-Greenberger et al., 2010).

This study does have some limitations. First, egocentric network data were used and the perception of respondents on the weight and weight control behaviors of their social ties may not be accurate. However, assessments of the primary (closest) three social ties tend to have higher reliabilities and validities (Kogovske & Ferligoj, 2004). Second, the study focused on the primary three social ties and did not assess the entire personal network but past work suggests that only a small number of close social ties matter for weight change (Christakis & Fowler, 2007). Third, the relatively small sample size precludes detection of small associations. Finally, the network data were cross-sectional and the directionality of relationships is not known.

The strengths of this study include being one of the first to examine weight and weight control behaviors of Latinas and their social ties. Weight loss and weight gain in normal and overweight participants were examined. Weight change of participants was objectively measured overtime. The reported results have implication for future lifestyle interventions for Latinas as only a few pilot studies have intervened beyond the individual level thus far (Avila & Hovell, 1994; Foreyt, Ramirez, & Cousins, 1991; Marquez & Wing, 2013; Poston et al., 2001; Sorkin et al., 2014).

Conclusion

The results of this study, showing that Latinas and their social ties engage in similar weight control behaviors, are consistent with the social network perspective that one's behaviors are a reflection of their social ties. Shared weight related behaviors and weight change between participants and their social ties may impact intervention outcomes. Having a social network with a greater proportion of individuals engaging in weight control behaviors may be indicative of greater behavioral exposure and reinforcement or social norms. Weight control behaviors of social ties may be more important than their weight status in promoting weight change in participants. Future studies that intervene at the network level may more effectively change and sustain behavior as well as have broader reach.

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Table 1

Participant Baseline Characteristics

	N (%)
Age (years)	
18–35	32 (29.9)
36–50	57 (53.3)
>51	18 (16.8)
Ethnicity	
Mexican-American	91 (85.0)
Colombian	4 (3.7)
Puerto Rican	2 (1.9)
Other	10 (9.4)
Education	
Less than high school graduate	17 (15.9)
High school graduate	50 (46.7)
College graduate	40 (37.4)
Marital status	
Married	68 (63.6)
BMI (kg/m ²) ^a	28.59 ± 4.98

Note.

^aMean ± standard deviation.

Table 2

Participant and Participant-Reported Social Ties Weight Status and Weight Change

	Participant N (%)	Social ties (%)	ICC
Weight status			
Underweight	0 (0.0)	8.9	–
Normal weight	24 (22.4)	45.7	0.11
Overweight	83 (77.6)	45.4	0.09
Weight change status			
Gained weight	55 (51.4)	15.5	0.33 *
Mean percent weight gain ^a	3.63 ± 2.89		
Lost weight	50 (46.7)	32.8	0.31 *
Mean percent weight loss ^a	–3.19 ± 3.06		

Note.

ICC: Intraclass correlation coefficient

^aMean ± standard deviation.

* p < 0.05.

Table 3
 Association of Participant-Reported Social Ties Weight Control Behavior with Participant Weight Control Behavior

Weight control behavior	Participant N (%)	Social ties (%)	ICC	OR	95% CI
Low fat foods	89 (83.9)	71.1	0.54*	1.425*	1.140–1.781
Low calorie meals	83 (78.3)	61.3	0.45*	1.271*	1.062–1.521
Small portions	80 (75.4)	60.5	0.19	1.093	0.920–1.298
Exercise	69 (65.0)	46.1	0.39*	1.176*	1.024–1.351
Self-weighting	62 (58.4)	53.5	0.36*	1.334*	1.140–1.562
Special diet	51 (48.1)	39.7	0.18	1.021	0.897–1.162
Meal replacement bars	49 (46.2)	47.0	0.67*	1.341*	1.171–1.536
Calorie counting	36 (33.9)	26.1	0.45*	1.427*	1.190–1.710
Herbal teas	28 (26.4)	16.9	0.52*	1.320*	1.092–1.596
Liquid meal replacements	24 (22.6)	19.9	0.54*	1.334*	1.117–1.593
Girdle	20 (18.9)	7.6	0.35*	1.016	0.776–1.331
Herbal supplements	19 (17.9)	14.3	0.48*	1.380*	1.119–1.702
Frozen prepackaged meals	11 (10.3)	14.1	0.48*	1.281*	1.004–1.634
Fast	11 (10.3)	11.0	0.57*	1.337*	1.037–1.724
Smoke cigarettes	7 (6.6)	9.0	0.52*	1.670*	1.166–2.390
Laxatives	5 (4.7)	3.1	0.30*	–	–
Weight loss program	3 (2.8)	3.2	0.25*	–	–
Diet pills	2 (1.8)	6.0	0.13	–	–

Note.

ICC: Intraclass correlation coefficient, OR: Odds ratio, CI: Confidence interval

Models are adjusted for study group and baseline characteristics.

* p 0.05.

Table 4
 Association of Participant-Reported Social Ties Weight and Weight Change with Participant Weight Control Behavior

Participant	Social ties									
	Weight control behavior		Normal weight		Overweight		Weight loss		Weight gain	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Low fat foods	0.871	0.727–1.045	1.217	0.994–1.490	1.293*	1.018–1.642	0.930	0.736–1.175		
Low calorie meals	0.943	0.810–1.098	1.085	0.927–1.271	1.196	0.992–1.441	0.992	0.798–1.232		
Small portions	0.819*	0.703–0.954	1.158	0.994–1.349	1.207*	1.011–1.441	0.958	0.785–1.169		
Exercise	1.017	0.896–1.154	1.008	0.889–1.143	0.910	0.796–1.040	1.181	0.969–1.440		
Self-weighting	0.876*	0.770–0.997	1.095	0.965–1.242	1.138	0.992–1.305	1.039	0.871–1.240		
Special diet	0.875*	0.770–0.995	1.119	0.987–1.269	0.880	0.771–1.004	1.089	0.913–1.298		
Meal replacement bars	1.058	0.938–1.192	0.920	0.815–1.039	0.977	0.863–1.105	1.097	0.925–1.301		
Calorie counting	0.951	0.828–1.091	1.057	0.923–1.211	0.939	0.815–1.082	1.026	0.852–1.235		
Herbal teas	0.844*	0.728–0.979	1.150	0.999–1.323	0.977	0.846–1.129	1.206	0.998–1.457		
Liquid meal replacements	0.873	0.747–1.020	1.076	0.923–1.254	1.026	0.882–1.192	0.961	0.762–1.211		
Girdle	0.913	0.782–1.067	1.125	0.964–1.313	1.046	0.896–1.221	0.933	0.742–1.174		
Herbal supplements	0.821*	0.690–0.979	1.130	0.960–1.330	0.991	0.841–1.168	1.361*	1.078–1.717		
Frozen prepackaged meals	0.972	0.795–1.189	0.923	0.753–1.131	1.090	0.892–1.331	0.928	0.689–1.248		
Fast	1.143	0.921–1.418	0.930	0.744–1.162	0.853	0.674–1.079	1.272	0.972–1.666		
Smoke cigarettes	1.219	0.902–1.647	0.892	0.658–1.209	0.577*	0.344–0.969	0.976	0.664–1.436		
Laxatives	–	–	–	–	–	–	–	–	–	–
Weight loss program	–	–	–	–	–	–	–	–	–	–
Diet pills	–	–	–	–	–	–	–	–	–	–

Note.

OR: Odds ratio, CI: Confidence interval

Models are adjusted for study group and baseline characteristics.

* p 0.05.

Table 5

Association of Participant and Participant-Reported Social Ties Weight Control Behavior and Weight Status with Participant Weight Change

	Participant weight loss				Participant weight gain			
	OR	CI	R ²	p-value	OR	CI	R ²	p-value
Participant low calorie meals ^a	3.817	1.288–11.313	0.103	0.016	0.328	0.116–0.924	0.074	0.035
Participant low calorie meals ^b	4.082	1.312–12.700	0.105	0.015	0.290	0.097–0.866	0.081	0.027
Social ties low calorie meals	0.997	0.983–1.011		0.669	1.005	0.992–1.020		0.442
Participant low calorie meals ^c	3.684	1.228–11.049	0.144	0.020	0.341	0.120–0.969	0.102	0.044
Social ties normal weight	0.885	0.778–1.006		0.061	1.102	0.973–1.248		0.127
Participant low calorie meals ^d	3.948	1.266–12.315	0.147	0.018	0.302	0.101–0.899	0.110	0.031
Social ties low calorie meals	0.996	0.982–1.011		0.623	1.006	0.992–1.020		0.399
Social ties normal weight	0.884	0.774–1.005		0.059	1.105	0.975–1.253		0.118
Participant low fat foods ^a	4.254	1.196–15.129	0.094	0.025				
Participant low fat foods ^b	4.721	1.213–18.375	0.096	0.025				
Social ties low fat foods	0.997	0.982–1.012		0.660				
Participant low fat foods ^c	3.778	1.041–13.717	0.129	0.043				
Social ties normal weight	1.016	0.894–0.787		0.086				
Participant low fat foods ^d	4.198	1.061–16.617	0.131	0.041				
Social ties low fat foods	0.996	0.981–1.012		0.651				
Social ties normal weight	0.894	0.787–1.016		0.086				

Note.

OR: Odds ratio, CI: Confidence interval, R²: pseudo R square statistic

^aParticipant weight control behavior predicting participant weight change adjusted for study group and baseline characteristics.

^bParticipant weight control behavior predicting participant weight change adjusted for study group, baseline characteristics, and proportion of social ties that engage in weight control behavior.

^cParticipant weight control behavior predicting participant weight change adjusted for study group, baseline characteristics, and proportion of social ties that are normal weight.

^dParticipant weight control behavior predicting participant weight change adjusted for study group, baseline characteristics, proportion of social ties that engage in weight control behavior, and proportion of social ties that are normal weight.