



Published in final edited form as:

Obesity (Silver Spring). 2015 August ; 23(8): 1570–1576. doi:10.1002/oby.21155.

Social Network Characteristics Associated with Weight Loss among Black and Hispanic Adults with Overweight and Obesity

Ginger Winston^a, Erica G. Phillips^b, Elaine Wethington^c, Carol Devine^d, Martin Wells^e, Janey C. Peterson^b, Jessica Hippolyte^b, Rosio Ramos^b, Guillerma Martinez^b, Johanna Eldridge^d, and Mary Charlson^b

^a Division of General Internal Medicine, Department of Medicine, George Washington University, Washington, DC

^b Division of Clinical Epidemiology and Evaluative Sciences Research, Department of Medicine, Weill Cornell Medical College, New York, NY

^c Department of Human Development, Cornell University, Ithaca, NY

^d Division of Nutritional Sciences, Cornell University, Ithaca, NY

^e Department of Statistical Science, Cornell University, Ithaca, NY

Abstract

Objective—To examine social network member characteristics associated with weight loss.

Methods—Cross-sectional examination of egocentric network data from 245 Black and Hispanic adults with BMI ≥ 25 kg/m² enrolled in a small change weight loss study. The relationship between weight loss at 12 months and characteristics of helpful and harmful network members (relationship, contact frequency, living proximity and body size) were examined.

Results—There were 2,571 network members identified. Mean weight loss was $-4.8 (\pm 11.3)$ lbs. among participants with network help and no harm with eating goals vs. $+3.4 (\pm 7.8)$ lbs. among participants with network harm alone. In a multivariable regression model, greater weight loss was associated with help from a child with eating goals ($p=.0002$) and coworker help with physical activity ($p=.01$). Weight gain was associated with having network members with obesity living in the home ($p=.048$) and increased network size ($p=.002$).

Conclusions—There was greater weight loss among participants with support from children and coworkers. Weight gain was associated with harmful network behaviors and having network members with obesity in the home. Incorporating child and co-worker support, and evaluating network harm and the body size of network members should be considered in future weight loss interventions.

Users may view, print, copy, and download text and data-mine the content in such documents, for the purposes of academic research, subject always to the full Conditions of use:http://www.nature.com/authors/editorial_policies/license.html#terms

Corresponding Author: Ginger Winston, MD MPH.

Disclosures: The authors have no conflicts of interest.

Author Contributions: Study design: Winston, Phillips, Wethington, Charlson. Data collection, analysis: Winston, Phillips, Ramos, Wells, Martinez, Charlson. All authors were involved in the writing and revision of the manuscript.

Keywords

social networks; social support; obesity; weight loss

Introduction

Obesity affects over one-third of adults in the United States, with higher prevalence among Blacks (50%) and Hispanics (38%).¹ Despite numerous studies aimed to achieve weight loss through individual behavior change, weight reduction and maintenance remain a significant challenge. Social networks have been shown to help and harm weight loss behavior change.^{2,7} However, weight loss interventions that have engaged network members have had inconsistent results. While small studies have found weight loss benefits from recruiting network member social support^{2,3}, others have found a benefit only if network members also lose weight.^{4,5} In addition, study data are limited on network behaviors that undermine weight loss, particularly among Black and Hispanic adults.^{6,7} Further data are needed on network member characteristics associated with weight loss to design weight management interventions that effectively engage networks.

This study uses egocentric social network data (data collected from the perspective of the index participant⁸) to examine the relationship between weight loss and network member characteristics, specifically network help with weight loss goals, harm to goals, network member relationship, importance of relationship, contact frequency, living proximity and body size. Index participants were Black and Hispanic adults enrolled in a behavior change weight loss trial. We hypothesized that participants with network members helpful with eating or physical activity goals and no network members harmful to goals would have greater weight loss compared to participants with network harm to goals. We also hypothesized less weight loss among participants who identified network members with obesity compared to those who did not.

Methods

Setting and Participants

Participants were Black and Hispanic adults with overweight and obesity enrolled in the Small Changes and Lasting Effects (SCALE) trial, a randomized controlled behavior change weight loss study conducted in New York City. Eligibility criteria were age ≥ 21 years, body mass index (BMI) ≥ 25 kg/m² and self-identification as Black and/or Hispanic. The criteria for recruitment and data collection methods have been previously described.⁹ Participants were recruited at clinical and community sites in Harlem and the South Bronx, New York (Lincoln Medical and Mental Health Center; Sydenham and Lenox Avenue Health Centers; Abyssinian, Congregación, and Metropolitan churches; and East Side Settlement). The study was approved by the Institutional Review Boards at Lincoln Medical and Mental Health Center and Weill Cornell Medical College. All participants provided written informed consent.

Small Change Intervention

At enrollment participants identified eating challenges and selected one of ten small change eating strategies to address their challenge.⁹ The small change approach to weight loss is theorized to increase self-efficacy for sustainable behavior change by targeting a modest energy deficit of 200-300 kcal per day.¹⁰⁻¹² The ten eating strategies were: prepare the main meal at home, take time for meals, drink water instead of sweetened beverages, eat a fruit or vegetable before snacking, eat breakfast, half the main meal vegetables, turn off the television during meals, stop buying snack foods, hide snacks in an inconvenient place, and eat main meals on a 10 inch plate.^{9,13} Participants also set physical activity goals. Each participant contracted to follow their goals at least 6 days per week. Participants were then randomized to receive either a positive affect/self-affirmation intervention in addition to the small change eating and physical activity intervention, or the small change intervention alone. Participants who received the positive affect/self-affirmation intervention were asked to reflect on positive moments in their lives, and recall proud moments when faced with obstacles completing their goals.^{14,15}

Participants were enrolled from August 2012-September 2013 and followed for one year by trained community health workers at routine intervals (weekly for months 1-3; biweekly months 4-9; once monthly for months 10-12). Close-out interviews were conducted at month 12.

Measures

Socio-demographic and clinical data were collected at enrollment. Participant height and weight were measured at enrollment and study completion. At study completion, participants completed an assessment of their social network by listing network members using the Convoy Model of Social Relations, a set of three overlapping concentric circles.¹⁶ Network members were defined as “people who are important in your life right now.” In the inner circle participants listed members “to whom you are so close it is hard to imagine life without”; in the middle circle “people to whom you may not feel quite that close to but who are still very important to you”; and the outer circle “people whom you haven’t already mentioned but who are close enough and important enough in your life that they should be placed in your personal network.” There was no limit on the number of members listed. Participants were asked to provide the following information on each member: age, relationship, frequency of contact (once a day, several times a week, once a week, a few times a month, or once a month), living proximity (lives in the home, within walking distance, within same borough, within the 5 boroughs, outside of New York City), and perceived body size. Body size was measured using the Stunkard figure rating scale.^{17,18}

Participants were asked the following question regarding each network member, “Did they help you with your eating goals in the SCALE study?” Answer options were: helped, made it more difficult (referred to as ‘harmed’) or neither. The same question was asked regarding physical activity. Using these data the following covariates were created: network help only, harm only, help and harm, and neither help nor harm. The same subgroups were created for physical activity. Covariates were created to describe the relationship of helpful and harmful members (i.e. at least 1 child helpful with eating goals), and the number of network

members with obesity living in the home. Finally, participants were asked, “What did the people we just talked about say that helped or made it more difficult for you to follow your eating goals?” The same question was asked regarding physical activity.

Statistical Analysis

Descriptive statistics were calculated using means and proportions. One way analysis of variance (ANOVA) tests were used to compare mean values for weight loss stratified by network help and/or harm with eating and physical activity goals. Student's t-tests were used to compare mean weight loss between participants with vs. without network members helpful with eating goals (or physical activity goals) stratified by member relationship.

A multivariable regression model was used to examine the relationship between weight loss (dependent variable) and network help and/or harm with goals. In the model, the following covariates were examined: harm only with eating goals, help and harm with eating goals, neither help nor harm with eating goals (compared to referent group = help only with eating goals). Network help and/or harm with physical activity was examined in the same model using similar subgroups (referent group = help only with physical activity goals). The model was adjusted for participant age, race/ethnicity, gender, education, study site, randomization group and network size.

A second multivariable regression model was used to examine the relationship between weight loss and the following covariates: at least one child helpful with eating goals, at least one co-worker helpful with physical activity, and at least one network member with obesity living in the home. The model was controlled for participant age, race/ethnicity, gender, education, study site, randomization group and network size. In exploratory analyses the variable “at least one inner circle network member helpful with eating goals” was included in the fully adjusted model. Interactions by race/ethnicity and gender in the relationship between weight loss and child help with eating goals were examined in a fully adjusted model.

In exploratory analyses, an average score was calculated for the number of network members helpful or harmful with eating goals (+1 for each helpful member, -1 for each harmful member and 0 for members neither helpful nor harmful). This score was examined in a linear regression model with weight loss as the outcome variable. Qualitative comments were reviewed by two independent evaluators who formulated a consensus on the major themes.

Results

A total of 405 participants were randomized in the SCALE trial; 247 completed the study and network data were collected on 245. Table 1 shows the baseline characteristics of participants who provided network data. Participants were primarily women (89%), mean age 50.5 years, 51% Black, 49% Hispanic, 76% completed high school, 76% insured, and 49% employed. English was the native language for 95% of Black and 12% of Hispanic participants. The mean age of study non-completers was younger than completers (44.5 vs. 50.5 years, $P < .0001$), and non-completers had a borderline larger BMI at enrollment (34.7

kg/m² vs. 33.5 kg/m², $P=.05$). There was no difference in mean MOS social support scores between non-completers vs. completers ($P=.2$), nor in the percent of children living in the home ($P=.3$). **Table 2** shows the characteristics of the network members ($n=2,571$, mean network size $n=10$). The highest percentages were friends (35%), children (17%), and siblings (15%). Thirty-one percent of members were identified as overweight ($25 \leq \text{BMI} < 30 \text{ kg/m}^2$), and 10% obese ($\text{BMI} \geq 30 \text{ kg/m}^2$).

The inner circle was 29% children, 17% friends, 17% siblings, 12% other family, 8% parents and 7% partners (defined as husband, wife, boyfriend, girlfriend, significant other). Of the 106 partners identified, 92% were in the inner circle. The middle circle was 53% friends, 18% siblings, 16% other family, and 2% children. The outer circle was 71% friends, 10% other family, 10% coworkers and 3% sibling.

Table 3 shows mean weight loss stratified by network help and/or harm with eating or physical activity goals. For eating goals, mean weight loss was -4.8 lbs. for participants with network help and no harm; -5.4 lbs. with both help and harm; +3.4 lbs. with harm alone; and -0.4 lbs. with no help or harm (ANOVA, $P=.006$). There was no difference in mean weight loss when network help and/or harm with physical activity was examined (**Table 3**, $P=.06$).

There was no difference in weight loss between participants with 1 vs. 2 vs. 3 or more network members helpful with eating goals [-6.1 vs. -7.5 vs. -4.0 lbs., $P=.18$], or physical activity goals [-4.2 vs. -5.9 vs. -4.6 lbs., $P=.74$].

Network member relationship

In bivariate analyses, participants with at least one child helpful with eating goals had greater weight loss compared to participants without a helpful child ($P=.003$; **Table 4**). Weight loss was greater among participants with at least one child helpful with physical activity goals ($P=.02$; **Table 4**). When examined by child age, there was greater weight loss among participants with vs. without an adult child (≥ 18 years) helpful with eating goals [-6.1 (± 10.0) vs. -2.8 (± 10.8) lbs., $P=.03$], but not physical activity [-5.9 (± 9.1) vs. -3.1 (± 11.1) lbs., $P=.07$]. There was no difference in weight loss between participants with vs. without a young child (< 18 years) helpful with eating goals [-6.1 (± 13.9) vs. -3.5 (± 10.1) lbs. $P=.30$] or physical activity [-5.7 (± 13.4) vs. -3.5 (± 10.1) lbs., $P=.26$].

There was a borderline difference in weight loss between participants with a co-worker helpful with physical activity goals vs. no coworker help ($P=.05$).

Circle position, Frequency of contact, Living Proximity, Body size

Participants with at least one child in the inner circle helpful with eating and physical activity goals had greater weight loss compared to those without child help in the inner circle [-6.8 (± 11.6) vs. -2.6 (± 10.4) lbs., $P=.007$]. The majority of children (95%) were identified as inner circle members. There was no difference in mean weight loss between participants with vs. without helpful inner circle members of other relationships.

Participants in contact with a child helpful with eating goals once a week (but at least once a month) had borderline greater weight loss compared to those with more frequent contact

[-13.9 (\pm 10.7), $n=8$ vs. -5.6 (\pm 11.2) lbs., $n=93$, $P=.05$]. There was no difference in mean weight loss when frequency of contact with helpful vs. non-helpful network members was examined by other relationships.

There was no difference in mean weight loss between participants with a child helpful with eating goals living in the home vs. not [-6.0 (\pm 12) lbs., $n=55$ vs. -6.7 (\pm 8.5) lbs., $n=23$, ($P=.80$)]. Participants with at least one network member with obesity lost less weight compared to those without [-2.4 (\pm 10.8) lbs., $n=138$ vs. -5.6 (\pm 10.3) lbs., $n=107$, $P=.02$].

Multivariable regression models

Table 5 shows two multivariable linear regression models examining the relationship between participant weight loss and network characteristics. Model 1 shows the relationship between weight loss and network help and/or harm with goals. Participants with network member harm to eating goals and no help gained weight compared to a referent group of participants with help alone ($P=.02$). Participants with both help and harm to eating goals had no difference in weight loss compared to those with help alone ($P=.29$). There was an association between weight gain and increased network size ($P=.001$).

The second model (**Table 5**; Model 2) examines the relationship between weight loss and child or coworker help with goals. Participants with at least one child helpful with eating goals had greater weight loss compared to those without child help ($P=.0002$). Participants with at least one coworker helpful with physical activity goals had greater weight loss compared to those without coworker help ($P=.01$). Weight gain was associated with having at least one network member with obesity living in the home ($P=.0048$) and increasing network size ($P=.002$). Child help with eating goals remained significant ($P=.01$) when the variable “at least one child helpful with physical activity goals” ($P=.55$) was entered into the fully adjusted model. When the variable “at least one network member with obesity” was examined in Model 2 there was a significant association with weight gain [estimate 3.57 (95% CI 1.04, 6.10), $P=.006$]. When the variable “at least one inner circle member helpful with eating goals” was included in Model 2 ($p=0.3$), child help with eating goals remained significant ($p=.0037$). There was no interaction by participant race/ethnicity ($P=.72$) or gender ($P=.14$) in the relationship between weight loss and child help with eating goals in the fully adjusted model.

In exploratory analyses, we found no significant relationship between weight loss and the score given for average number of network members helpful and harmful with eating goals ($p=0.4$), suggesting no linear relationship between the number of helpful and harmful members and weight loss. In additional exploratory analyses, network size was larger among participants with network harm to eating goals compared to participants with no harm [11.6 (\pm 5.7), $n=73$ vs. 9.9 (\pm 5.6), $n=172$, $P=.047$]. In an unadjusted regression model, the number of network members with obesity increased (independent variable) as network size increased [estimate = 0.75 (S.E. 0.27), $P=.005$].

Qualitative comments

Table 6 shows participant comments regarding ways in which network members helped or harmed goals. Participants reported that helpful network behaviors included encouraging statements and joining in behavior change. Harmful behaviors included negative and discouraging comments, and network members engaging in unhealthy eating behaviors.

Discussion

There are three primary findings in this study: (1) participants who reported network behaviors that harmed eating goals and no network help gained weight compared to those with help alone; (2) participants with child help with eating goals, or coworker help with physical activity, had greater weight loss compared to those without these helpful members; and (3) weight gain was associated with having at least one network member with obesity living in the home and larger network size.

To our knowledge, this is the first published study to use egocentric network data to examine network member characteristics associated with weight loss among Black and Hispanic adults with obesity. Previous studies have examined the relationship between social support and weight loss, however, results have been inconsistent and assessment of social undermining limited.^{2,5, 19,22} Recently, Wang et al. found that family undermining of healthy eating was associated with weight gain.⁷ Our results show weight gain among participants with network harm and no help with eating goals. There was no relationship between the number of helpful and harmful network members and amount of weight loss. Interestingly, there was no difference in weight loss between participants who experienced both network help and harm with goals, compared to those with help alone. This suggests that help from network members may counteract harmful network behaviors. Further investigation is needed to assess whether network support in weight loss can be used to counteract negative influences.

We found that participants with a child helpful with goals had greater weight loss compared to those without child support. Published studies of parent-child involvement in the weight loss process have primarily focused on addressing childhood obesity.²³ Limited study data have addressed the role of child support in parental weight loss. In a study of parent support for child weight loss, Epstein et al. found that parents lost more weight when they were actively engaged in their child's weight loss efforts.²⁴ More recently, reciprocal parent-child encouragement was found to increase co-participation in physical activity among Mexican-American families.²⁵ Our data indicate that child support may be an important strategy in parental weight loss. We also found the benefit of child support to be independent of the living proximity of the child. In addition, our data suggest that help from coworkers with physical activity goals is associated with greater weight loss. This finding is consistent with published data showing higher physical activity scores among adults with work-site social support.²¹

We did not find increased weight loss among participants with help from friends. This did not change when the importance of the friendship, frequency of contact, or body size of friends were examined. One potential explanation is that help from friends is not sufficient

to counteract other network influences. Published data suggest that support from friends is associated with weight loss only if the friends also lose weight.^{4,5} The dose and specific type of help may also play a role and were not measured.

Participants who reported network members with obesity had less weight loss in our study. We cannot conclude, however, that the body size of network members influenced weight loss patterns. While longitudinal data analyzed from the Framingham Study suggest a role for network body size in index individual weight gain²⁶, limitations of this analysis have been raised.²⁷ Future longitudinal examination of the relationship between network body size and weight loss are needed.

The average number of close network members identified in our study is similar to previously published literature.²⁸ We found less weight loss as network size increased. In exploratory analyses, we found a larger network size was associated with having members harmful to goals and members with obesity. Previous investigators have postulated that an increased number of family ties may reflect increased burden of responsibilities or obligations, resulting in higher stress and less time to engage in healthier lifestyles.²⁰

Our qualitative data offer insight into ways in which network members can help or harm weight loss behavior change. Similar themes of network help and sabotage have been reported.⁶ Positive reinforcement, co-participation in exercise, and avoiding criticism have been identified as helpful behaviors among African American women engaged in weight loss efforts.²⁹

Our study has limitations. We collected egocentric network data and therefore do not have data from the perspective of network members. Data from network members may have provided further insight into behaviors perceived as harmful. We did not collect network data from participants who did not complete the study. In addition, we cannot comment on how network composition may have changed during the course of the study. We also lack data on the dose of the network help provided. It is possible that participants with and without child support differ on characteristics other than those included in the multivariable model such as self-efficacy. Finally, the body size of network members was based on participant perception measured using a figure rating scale.

Conclusion

Network help with weight loss goals, specifically child and co-worker help, were associated with increased weight loss. Harmful network behaviors in the absence of network help, and the presence of network members with obesity living in the home were associated with weight gain. These findings suggest that future weight loss behavior change interventions would benefit from engaging the support of children and co-workers, as well as, assessing harmful network behaviors and network member body size. Weight loss studies are needed that measure network characteristics longitudinally to better understand how networks may influence weight loss patterns and how network composition may change over time.

Acknowledgements

A special thank you to the participating clinical and community sites, and to the SCALE community health workers. Thank you to Dr. William Dietz for contributing to the paper revision.

Funding: This research was supported by NHLBI grant #U01HL097843, and a NHLBI Minority Investigator Research Supplement (parent grant #U01HL097843). The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

References

1. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of obesity in the United States, 2009-2010 NCHS Data Brief. 2012; 82:1–8. [PubMed: 22617494]
2. Black DR, Gleser LJ, Kooyers KJ. A meta-analytic evaluation of couples weight-loss programs. *Health Psychol.* 1990; 93:330–347. [PubMed: 2140323]
3. Wing RR, Jeffery RW. Benefits of recruiting participants with friends and increasing social support for weight loss and maintenance. *J Consult Clin Psychol.* 1999; 67:132–138. [PubMed: 10028217]
4. Gorin A, Phelan S, Tate D, Sherwood N, Jeffery R, Wing R. Involving support partners in obesity treatment. *J Consult Clin Psychol.* 2005; 73:341–343. [PubMed: 15796642]
5. Kumanyika SK, Wadden TA, Shults J, et al. Trial of family and friend support for weight loss in African American adults. *Arch Intern Med.* 2009; 169:1795–1804. [PubMed: 19858438]
6. Kiernan M, Moore SD, Schoffman DE, et al. Social support for healthy behaviors: scale psychometrics and prediction of weight loss among women in a behavioral program. *Obesity.* 2012; 20:756–764. [PubMed: 21996661]
7. Wang ML, Pbert L, Lemon SC. Influence of family, friend and coworker social support and social undermining on weight gain prevention among adults. *Obesity.* 2014; 22:1973–1980. [PubMed: 24942930]
8. Marsden, P. Recent Developments in Network Measurements.. In: Carrington, P.; Scott, J.; Wasserman, S., editors. *Models and Methods in Social Network Analysis.* Cambridge University Press; New York: 2005. p. 1-9.
9. Phillips-Caesar EG, Winston G, Peterson J, Wansink B, Devine C, Kanna B, Michelin W, Wethington E, Wells M, Hollenberg J, Charlson M. Small changes and lasting effects (SCALE) trial: The formation of a weight loss behavioral intervention using EVOLVE. *Contemp Clin Trials.* 2015; 41:118–128. [PubMed: 25633208]
10. Hill JO. Can a small-changes approach help address the obesity epidemic? A report of the Joint Task Force of the American Society for Nutrition, Institute of Food Technologists, and International Food Information Council. *Am J Clin Nutr.* 2009; 89:477–484. [PubMed: 19088151]
11. Lutes LD, Daiss SR, Barger SD, Read M, Steinbaugh E, Winett RA. Small changes approach promotes initial and continued weight loss with a phone-based follow-up: nine-month outcomes from ASPIRES II. *Am J Health Promot.* 2012; 26:235–8. [PubMed: 22375574]
12. Lutes LD, Dinatale E, Goodrich DE, et al. A randomized trial of a small changes approach for weight loss in veterans: design, rationale, and baseline characteristics of the ASPIRE-VA trial. *Contemp Clin Trials.* 2013; 34:161–72. [PubMed: 23041618]
13. Wansink B. From mindless eating to mindlessly eating better. *Physiol Behav.* 2010; 100:454–463. [PubMed: 20470810]
14. Peterson JC, Charlson ME, Hoffman Z, et al. A randomized controlled trial of positive-affect induction to promote physical activity after percutaneous coronary intervention. *Arch Intern Med.* 2012; 172:329–336. [PubMed: 22269589]
15. Charlson ME, Boutin-Foster C, Mancuso CA, et al. Randomized controlled trials of positive affect and self-affirmation to facilitate healthy behaviors in patients with cardiopulmonary diseases: Rationale, trial design, and methods. *Contemp Clin Trials.* 2007; 28:748–762. [PubMed: 17459784]
16. Antonucci TC, Akiyama H. Social networks in adult life and a preliminary examination of the convoy model. *J Gerontol.* 1987; 42:519–527. [PubMed: 3624811]

17. Stunkard AJ, Sørensen T, Schulsinger F. Use of the Danish Adoption Register for the study of obesity and thinness. *Res Publ Assoc Res Nerv Ment Dis.* 1983; 60:115–120. [PubMed: 6823524]
18. Bulik CM, Wade TD, Heath AC, Martin NG, Stunkard AJ, Eaves LJ. Relating body mass index to figural stimuli: population-based normative data for Caucasians. *Int J Obes Relat Metab Disord.* 2001; 25:1517–1524. [PubMed: 11673775]
19. Ball K, Crawford D. An investigation of psychological, social and environmental correlates of obesity and weight gain in young women. *Int J Obes.* 2006; 30:1240–1249.
20. Tamers SL, Okechukwu C, Allen J, et al. Are social relationships a healthy influence on obesogenic behaviors among racially/ethnically diverse and socio-economically disadvantaged residents? *Prev Med.* 2013; 56:70–74. [PubMed: 23200880]
21. Tamers SL, Thompson B, Cheadle AD, Zheng Y, Bishop SK, Beresford SA. The association between worksite social support, diet, physical activity and body mass index. *Prev Med.* 2011; 53:53–56. [PubMed: 21570422]
22. Oliveira AJ, Rostila M, de Leon AP, Lopes CS. The influence of social relationships on obesity: sex differences in a longitudinal study. *Obesity.* 2013; 21:1540–1547. [PubMed: 23818388]
23. Faith MS, Van Horn L, Appel LJ, et al. Evaluating parents and adult caregivers as “agents of change” for treating obese children: evidence for parent behavior change strategies and research gaps: a scientific statement from the American Heart Association. *Circulation.* 2012; 125:1186–1207. [PubMed: 22271754]
24. Epstein LH, Wing RR, Koeske R, Andrasik F, Ossip DJ. Child and parent weight loss in family-based behavior modification programs. *J Consulting and Clin Psychology.* 1981; 49:674–685.
25. De la Haye K, de Heer HD, Wilkinson AV, Koehly LM. Predictors of parent-child relationships that support physical activity in Mexican-American families. *J Behav Med.* 2014; 37:234–244. [PubMed: 23203139]
26. Christakis NA, Fowler JH. The spread of obesity in a large social network over 32 years. *N Engl J Med.* 2007; 357:370–379. [PubMed: 17652652]
27. Cohen-Cole E, Fletcher JM. Is obesity contagious? Social networks vs. environmental factors in the obesity epidemic. *J Health Econ.* 2008; 27:1382–1387. [PubMed: 18571258]
28. O'Malley JA, Arbesman S, Darby Miller S, Fowler J, Christakis N. Egocentric social network structure, health, and pro-social behaviors in a national panel study of Americans. *PLOS One.* 7(5):e36250. doi: 10.1371/journal.pone.0036250. [PubMed: 22615760]
29. Thomas JL, Stewart DW, Lynam IM, et al. Support needs of overweight African American women for weight loss. *Am J Health Behav.* 2009; 33:339–352. [PubMed: 19182980]

What is already known about this subject:

- Social networks can help or harm weight loss efforts among adults with obesity
- Weight loss interventions that have engaged social network members have had inconsistent results

What this study adds:

- Data on the relationship between weight loss and characteristics of helpful and harmful social network members (relationship, importance of relationship, frequency of contact, living proximity, body size)
- Egocentric social network data for Black and Hispanic adults with overweight and obesity

Table 1

Baseline characteristics of index participants completing social network assessment (n=245)

Characteristic	No. (%)
Women	219 (89%)
Age, mean (SD), y	50.5 (12.7)
Body mass index, mean (SD)	33.5 (5.9)
Race/ethnicity	
Black	124 (51%)
Hispanic	121 (49%)
Completed high school or beyond	187 (76%)
Insured	187 (76%)
Type of insurance	
Medicaid	56 (23%)
Medicare	32 (13%)
Commercial	81 (33%)
Currently employed	121 (49%)
Retired	35 (14%)
Unemployed, looking for work	28 (11%)
Native language English	
Black	118 (95%)
Hispanic	14 (12%)
Hypertension	80 (33%)
Diabetes	43 (18%)
Current smoker	13 (5%)

Table 2

Demographics of social network members

Characteristic	No. (%)
Total network members	2,571
Members < 18 years old	248 (10.3%)
Women	1,689 (66%)
Age of members 18 years old, mean (SD), y	49.2 (17.1)
Number of network members in each circle, mean, n (SD)	
Inner circle	6 (3.6)
Middle circle	3 (2.9)
Outer circle	1 (2.0)
Number of network members by relationship	
Friend	887 (35%)
Child	444 (17%)
Sibling	385 (15%)
Other family ^a	329 (13%)
Parent	133 (5%)
Grandchild	118 (5%)
Partner	106 (4%)
Coworker	69 (3%)
Other ^b	52 (2%)
Other undefined	14 (0.01%)
Body size of network member	
Underweight	195 (8%)
Normal weight	1,245 (51%)
Overweight	767 (31%)
Obese	248 (10%)
In contact once a day	918 (38%)
Living Proximity	
In the same home or building	476 (19%)
Outside home/building but within New York City	1,242 (51%)
Outside of New York City	725 (30%)

Missing data: age, n= 165; gender=17; relationship, n=32; body size, n=116; circle, n=11; frequency of contact, n=151; living proximity, n=128

^aOther family = aunt, uncle, cousin, niece, nephew, sister-in-law, brother-in-law, grandmother, grandfather, mother-in-law, father-in-law

^bOther = godmother, godfather, god-daughter, god-son, community health worker, church member, pastor, neighbor, prayer partner, therapist

Table 3Mean weight loss according to presence of helpful and/or harmful network members ^a

	Weight loss, mean (SD), lbs.	P value
Eating goals (n)		
Help only (n=134)	-4.8 (11.3)	.006
Help and Harm (n=60)	-5.4 (9.9)	
Harm only (n=13)	+3.4 (7.8)	
No help/no harm (n=38)	-0.4 (8.8)	
Physical activity (n)		
Help only (n=166)	-5.1 (10.8)	.06
Help and Harm (n=14)	-1.1 (11.0)	
Harm only (n=5)	-2.5 (4.0)	
No help/no harm (n=60)	-1.1 (10.4)	

^aLevel of significance set at $P < 0.05$

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 4

Mean weight loss stratified by the relationship of network members helpful with eating or physical activity goals

Help	Eating behavior help		Physical activity help	
	Weight loss, mean (SD), lbs., n	<i>P</i> value ^a	Weight loss, mean (SD), lbs., n	<i>P</i> value ^a
Child				
Yes	-6.3 (11.3), n=101	.003	-5.9 (10.9), n=93	.02
No	-2.1 (9.9), n=144		-2.6 (10.4), n=152	
Partner ^b				
Yes	-3.8 (11.1), n=55	.96	-5.2 (9.5), n=47	.32
No	-3.9 (10.6), n=190		-3.5 (10.9), n=198	
Sibling				
Yes	-4.3 (10.0), n=69	.69	-4.0 (10.7), n=51	.93
No	-3.7 (10.9), n=176		-3.8 (10.7), n=194	
Parent				
Yes	-4.4 (12.7), n=44	.69	-7.4 (14.8), n=21	.11
No	-3.7 (10.2), n=201		-3.5 (10.2), n=224	
Grandchild				
Yes	-7.0 (6.7), n=15	.23	-4.0 (5.3), n=16	.97
No	-3.6 (10.9), n=230		-3.8 (11.0), n=229	
Other family ^c				
Yes	-5.7 (10.4), n=36	.26	-3.5 (10.6), n=34	.85
No	-3.5 (10.7), n=209		-3.9 (10.7), n=211	
Friend				
Yes	-3.4 (11.4), n=114	.56	-2.9 (9.5), n=106	.24
No	-4.2 (10.0), n=131		-4.5 (11.4), n=139	
Co-worker				
Yes	-5.0 (12.8), n=16	.66	-10.1 (9.1), n=11	.05
No	-3.8 (10.6), n=229		-3.5 (10.7), n=234	

^aLevel of significance set at $P < 0.05$

^bPartner = husband, wife, boyfriend, girlfriend, significant other

^cOther family = aunt, uncle, cousin, niece, nephew, sister-in-law, brother-in-law, grandmother, grandfather, mother-in-law, father-in-law

Table 5

Two multivariable linear regression models examining the relationship between weight loss (lbs.) and network member help and/or harm with goals (N=245)^a

Variable	Model 1		Model 2	
	Estimate (95% CI)	P value ^b	Estimate (95% CI)	P value ^b
Eating harm only ^c	7.50 (1.31, 13.69)	.02		
Eating help and harm ^c	-1.78 (-5.08, 1.52)	.29		
No eating help or harm ^c	3.75 (-0.66, 8.15)	.10		
Physical activity harm only ^d	-0.79 (-8.70, 10.28)	.87		
Physical activity help and harm ^d	2.56 (-3.32, 8.43)	.39		
No physical activity help or harm ^d	3.09 (-0.51, 6.68)	.09		
Network size	0.40 (0.16, 0.64)	.001	0.38 (0.14, 0.61)	.002
At least 1 child helpful with eating goals			-5.15 (-7.89, -2.41)	.0002
At least 1 coworker helpful with physical activity goals			-8.17 (-14.37, -1.97)	.01
At least 1 network member with obesity living in the home			3.48 (0.03, 6.93)	.048

^aModels 1 and 2 are adjusted for participant age, race, gender, education, study site, and randomization group

^bLevel of significance set at $P < .05$

^cReferent group = Network help with eating goals

^dReferent group = Network help with physical activity goals

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 6

Qualitative themes regarding network help and harm with eating and physical activity goals

Network help:	Comments
Encouragement	<i>"My sister gave me positive feedback regarding drinking water "</i>
Join in behavior change	<i>"My wife would try to help by steaming food instead of frying and adding more vegetables"</i>
	<i>"As a family we are eating on 10 inch plates."</i>
	<i>"My son would say let's walk instead of taking the train or bus."</i>
	<i>"The girls (daughters and niece) don't drink soda like before. We stopped bringing soda into the house."</i>
Network harm:	
Negative/discouraging comments	<i>"My husband and sister criticized me. If they saw me serve less food or eat vegetables they said I wanted to be sexy. They made fun of me because I was eating healthier than before. They said I just wanted to be skinny."</i>
	<i>"She told me every day that I was fat"</i>
	<i>"My husband complained about the changes and efforts I was making to lose weight. He didn't want me to look better because he is very jealous."</i>
	<i>"My mother said, 'I don't see the difference you didn't lose weight'."</i>
Engaging in unhealthy behaviors	<i>"They ignored my request not to fry everything!"</i>
	<i>"My co-workers would get food and eat it in front of me such as potato chips and cookies"</i>
Encourage non-adherence to eating goals	<i>"People use to tell me that there is no point to be on a diet, that we get fat anyway. And that I'm not taking anything with me whenever I die."</i>
	<i>"They would say not to lose too much weight."</i>
	<i>"My husband feels like I need to be doing the same thing he is doing. He always asks me why I'm not baking any more cakes and pies for the house."</i>