Published in final edited form as:

Psychiatr Rehabil J. 2013 June ; 36(2): 65–71. doi:10.1037/h0094973.

Perceived Social Support for Diet and Exercise Among Persons With Serious Mental Illness Enrolled in a Healthy Lifestyle Intervention

Kelly A. Aschbrenner, PhD,

The Geisel School of Medicine at Dartmouth

Kim T. Mueser, PhD,

Boston University

Stephen J. Bartels, MD, MS, and

The Geisel School of Medicine at Dartmouth

Sarah I. Pratt, PhD

The Geisel School of Medicine at Dartmouth

Abstract

Objective—There is a lack of research on social support for health behavior change among persons with serious mental illness who face disproportionate morbidity and premature death due to cardiovascular disease. This study examined social contact and the demographic, health and clinical characteristics associated with perceived social support for diet and exercise among persons living with serious mental illness enrolled in a healthy lifestyle intervention.

Method—Baseline data from two ongoing studies of the In SHAPE healthy lifestyle intervention for persons with serious mental illness were included in this analysis ($N = 158$). Cross-sectional analyses examined social contact and correlates of both negative and positive experiences of social support for diet and exercise. Multiple linear regression was used to assess the relationship between demographic characteristics, symptoms, health, and social support.

Results—The majority (80.3%) of participants reported face-to-face contact at least twice monthly with a family member or friend. Readiness to change physical activity was associated with greater criticism from family for exercise behaviors, $r(64) = .29, p < .05$. Depressive symptoms ($\beta = .30, p < .01$) were significantly associated with more unhealthy family eating environments while controlling for the amount of family contact ($\beta = .27, p < .01$), while readiness to change dietary portion size ($\beta = .34, p < .01$) was associated with encouragement for healthy eating from friends.

Conclusion and Implications for Practice—Participants had regular contact with significant others who were a source of both positive and negative support for healthy eating and exercise.

Correspondence concerning this article should be addressed to Kelly A. Aschbrenner, Geisel School of Medicine, Dartmouth College, Center for Aging Research, 46 Centerra Parkway 201, Lebanon, NH 03766. kelly.aschbrenner@dartmouth.edu.

Kelly A. Aschbrenner, PhD, Center for Aging Research, The Geisel School of Medicine at Dartmouth; Kim T. Mueser, PhD, Center for Psychiatric Rehabilitation, Boston University; Stephen J. Bartels, MD, MS, and Sarah I. Pratt, PhD, Dartmouth Centers for Health and Aging, The Geisel School of Medicine at Dartmouth.

Engaging natural supports in supporting healthy behaviors may help persons with serious mental illness initiate and maintain lifestyle change.

Keywords

serious mental illness; health; family issues; social support

The life expectancy of persons with serious mental illness is an alarming 25–30 years less than that of the general population (Colton & Manderscheid, 2006; De Hert et al., 2011). A major cause of this early mortality is obesity-related diseases and cardiovascular problems caused by high rates of modifiable risk factors, including sedentary behavior and poor nutrition. Less than 20% of individuals with schizophrenia engage in moderate exercise at least once weekly (Brown, Birtwistle, Roe, & Thompson, 1999), compared to over 40% of adults in the general population (Centers for Disease Control and Prevention, 1996). Furthermore, people with schizophrenia have less healthy dietary habits, including lower consumption of fruits, vegetables, and fiber, and consumption of more calories and saturated fats compared to the general population (McCreadie & Scottish Schizophrenia Lifestyle Group, 2003; Jones et al., 2004; Strassnig, Brar, & Ganguli, 2003). A critical step toward improving the health of individuals living with serious mental illness is to develop lifestyle modification strategies to help people engage in regular physical exercise and to make the dietary changes required to reduce disease risks.

Although many adults in the general population struggle to change their health habits to lose weight and to improve cardiovascular health, mental illness is associated with cognitive, mood, and motivational challenges (Beck & Alford, 2009), contributing additional challenges to modifying diet and to developing an exercise routine. Reviews of research on lifestyle intervention studies for adults with serious mental illness have found that programs show significant, but modest, effects on weight loss and reducing risk factors for metabolic syndrome (Cabassa, Ezell, & Lewis-Fernández, 2010; Faulkner, Soundy, & Lloyd, 2003). For example, few studies have reported an average weight loss of 5% or more of body weight (Verhaeghe, De Maeseneer, Maes, Van Heeringen, & Annemans, 2011), the minimum amount of weight loss considered necessary to reduce risk of serious health problems (Faulkner et al., 2003). There is clearly a need to enhance the effectiveness of healthy lifestyle interventions for people with serious mental illness.

One potentially important, but neglected resource for enhancing lifestyle interventions for this group is the natural support system. Social support from family members and significant others has received increasing attention as a factor contributing to health outcomes (Korkiakangas et al., 2011; Rouse, Ntoumanis, Duda, Jolly, & Williams, 2011), and has been the target of lifestyle modification interventions for persons with a variety of medical conditions, including obesity, cardiovascular disease, and Type 2 diabetes (Kumanyika & Economos, 2011; Van Dyck et al., 2011). Lifestyle interventions that incorporate social support attempt to mobilize an existing social network to respond to specific health behavior needs of the index participant (Heaney & Israel, 2002), or target health behavior change in couples, friendship dyads, and whole families (Keogh et al., 2007; Voils et al., 2009; Wing, Marcus, Epstein, & Jawad, 1991). There is growing evidence supporting the effectiveness of

social support approaches enhancing diet and increasing physical activity compared to interventions that focus solely on an individual (Dunbar et al., 2005; Gorin et al., 2005).

Most research on families and mental illness has focused on reducing psychiatric relapses and hospitalizations (Pitschel-Walz, Leucht, Bauml, Kissling, & Engel, 2001), but little is known about how family members and significant others may influence the health behaviors of these individuals. To better understand the potential for social support to increase the effectiveness of healthy lifestyle interventions, we addressed the following questions in a study of newly enrolled participants in a healthy lifestyle intervention study: (a) What is the extent of contact with significant others? and (b) What characteristics are associated with positive and negative social support for healthy eating and exercise among overweight and obese adults with serious mental illness?

Method

Design and Subjects

This is a cross-sectional analysis of baseline data from two ongoing studies of the In SHAPE healthy lifestyle program. The In SHAPE studies were conducted at five public mental health centers, including four in New Hampshire and one in Boston, Massachusetts. Participants experienced serious mental illness (i.e., schizophrenia, schizoaffective disorder, major depression, or bipolar disorder) and were enrolled in a randomized controlled trial or implementation study of In SHAPE, an integrated health promotion program designed to improve physical fitness through dietary change and increasing exercise in this population (Van Citters et al., 2010). The In SHAPE program embeds health promotion within community-based mental health centers by providing each participant with a health mentor, who helps him or her develop a personal health plan and provides ongoing education, assistance with goal-setting, and motivational support through weekly, individual contacts.

In addition to one of the aforementioned diagnoses, inclusion criteria for both studies were: (a) age 21 or older; (b) body mass index (BMI) greater than 25 kg/m²; (c) physically inactive, defined as less than 30 min per day of moderate activity for 5 days per week, or less than 20 min per day of vigorous activity for 3 days per week; (d) stable pharmacological treatment, as defined by no changes in psychiatric medications over the prior 2 months; and (e) written medical clearance by a physician, physician assistant, or nurse practitioner to participate in an exercise program. Four institutional review boards approved the research across five sites, and all participants provided either written or verbal consent.

Study Measures

We selected demographic data and variables from the domains of psychiatric symptoms, health behaviors, and health status for our analyses of baseline data. Negative symptoms were assessed with the Scale for the Assessment of Negative Symptoms (Andreasen, 1981), a 24-item semistructured interview evaluating negative symptoms (e.g., apathy, amotivation, avolition) over the prior 2 weeks, yielding a total score, ranging from 0–120, with higher scores indicating more severe symptoms. Depression was measured with the Center for Epidemiologic Studies Depression Scale (Andresen, Malmgren, Carter, & Patrick, 1994), a

20-item, self-report scale used to identify depression in community populations. For each of 20 symptoms, the respondent indicated how many days over the past week the symptom was experienced (from 0 = *not at all* to 3 = *five to seven days*). Items are summed to achieve a total score, with a higher score indicating elevated levels of depression.

Health behaviors included readiness to change physical activity and eating behaviors. The Weight Loss Behavior–Stage of Change Scale (Sutton et al., 2003), was used to measure the degree to which individuals are engaged in dietary- and activity-related behaviors that can lead to weight loss. Summary scores are calculated for four domains: portion control, dietary fat, intake of fruits and vegetables, and physical activity. A five-statement set of responses to each question ranges from 1 (*I do not do this at least half the time now and I have no plans to do this* [precontemplation]) to 5 (*I do this at least half the time now and have been doing it more regularly for more than 6 months* [maintenance]), with higher scores indicating greater readiness to change behaviors.

BMI was calculated directly by the standard formula: weight (in kilograms) by height (in square meters). In accordance with national guidelines, overweight was defined as a BMI of 25.0–29.9 kg/m² and obesity was defined as a BMI of 30 kg/m² or more (National Institutes of Health, 1998). Social contact was assessed with a measure adapted from the Social Relationship Scale (McFarlane, Neale, Norman, Roy, & Streiner, 1981) and the Social Network Analysis approach (McCallister & Fisher, 1983). The respondent lists up to three family members and three friends whom they see most often and reports the frequency of contact with each person.

Social support was measured with a modified version of the Social Support for Diet and Exercise Behavior Scales (Sallis, Grossman, Pinski, Patterson, & Nader, 1987). The scales consist of two surveys that assess respondents' perceptions of positive and negative social support for eating behaviors (10 items) and exercise habits (13 items) from family members and friends, respectively. Respondents rate the frequency with which family members and friends had done or said what was described in the item during the previous 3 months on a 5-point scale, ranging from 1 (*none*) to 5 (*very often*). The eating behaviors survey produces two subscales (Encouragement and Discouragement), and two subscales are calculated from the exercise habits survey (Participation and Rewards and Punishments). Each survey produces separate subscales for family members and friends.

For the purposes of this study, we made two minor modifications to the survey subscale items. First, we modified the 3-item Rewards and Punishment subscale for exercise. Because the primary objective of the study was to examine participant characteristics associated with their perceptions of positive and negative social support for eating and exercise, we wanted one of the two exercise habits subscales to solely capture negative support while the other to represent positive support. Thus, we removed one item assessing rewards ("gave me rewards for exercising"), and renamed the subscale Criticism for Exercise Habits to reflect the two remaining items: "criticized me or made fun of me for exercising" and "complained about the time I spend exercising."

Second, we modified the 5-item Discouragement for Healthy Eating subscale by removing one item (“got angry when I encouraged them to eat low salt, low fat foods”) because it was not conceptually linked with the remaining four items, which represented unhealthy actions and behaviors among friends and family, such as buying or eating unhealthy foods in front of the respondent, specifically: “ate high fat or high salt foods in front of me”; “refused to eat the same foods I eat”; “brought home foods I’m trying not to eat”; and “offered me foods I’m trying not to eat.” Thus, we renamed the subscale Unhealthy Social Eating Environment because the variable more specifically relates to the respondent’s perception of negative eating behaviors and actions of family members and friends in their social environment, as opposed to negative verbal statements intended to discourage someone from adopting healthy eating practices (Cronbach’s $\alpha = .73$ and $.80$ for the modified subscales relating to friends and family members, respectively).

Background characteristics included race (1 = *white*, 0 = *non-white*), marital status (1 = *ever married*, 0 = *never married*), education (1 = *completed high school*, 0 = *did not complete high school*), living arrangements (1 = *independent*, 0 = *supervised*), diagnosis (1 = *schizophrenia spectrum*, 0 = *mood disorder*), age (years), and sex (1 = *male*, 0 = *female*).

Analysis

All data were recorded and entered into Microsoft Access databases, and statistical analysis was performed using PASW Statistics 18, Version 18.0.0 (SPSS Inc., Chicago, IL). Univariate analyses were conducted to describe the frequency of participants’ contact with family members and friends. To determine whether there were differences between participants with regular contact with significant others and those with little or no contact, we first compared the demographic, health, and clinical characteristics of participants with moderate-to-high levels of social contact (defined as at least twice monthly) to participants with less social contact by conducting two-tailed *t* tests and chi-square analyses. These analyses were conducted separately for contact with family members and friends. Because the primary research question addressed the relationship between social support and clinical and health status among participants with at least moderate levels of contact with significant others, we next explored whether the level of social contact within this group of participants was related to social support, in order to control for the possible confounding effects of social contact in subsequent analyses.

We then examined the associations between the social support variables (controlling for contact if it was significantly associated with social support domain) and the demographic, clinical, and health variables among participants with at least moderate levels of social contact. Bivariate correlations were computed with the Pearson product–moment correlation coefficient to examine the intercorrelations between continuous independent variables and the social support subscales for diet and exercise behaviors, and *t* tests were used to compare dichotomous independent variables and social support subscales. To control for social contact, partial correlation coefficients were computed for continuous independent variables and analysis of covariance was performed for dichotomous independent variables.

To determine which independent variables were uniquely associated with social support for diet and exercise behaviors, we performed multiple regression analyses including as

predictors those variables that were significantly related to support in the bivariate analyses. Stepwise multiple regression analysis was performed to control for social contact if contact was significantly associated with social support domain. Analyses were conducted separately for subscales of social support from family member and friends.

Results

Characteristics of the Sample

The average age (*SD*) of participants in the combined sample was 45.4 (11.5) years. Fifty-eight percent ($n = 92$) were women, and 7% ($n = 11$) were married at the time of the survey. Twenty-percent ($n = 33$) were living with a family member or a significant other. The majority of participants (79.7%, $n = 126$) were White, and 57.3% ($n = 90$) had a diagnosis of schizophrenia or schizoaffective disorder. A majority (79.1%, $n = 125$) had completed high school.

Frequency of Social Contact

The majority (80%) of participants reported regular contact defined as face-to-face contact at least twice monthly with either a family member or friend. The extent of social contact is presented in Table 1. Among participants with any family contact, those with moderate-to-high levels of family contact (i.e., at least twice monthly) differed significantly from those with less contact only on age, $t(135) = -3.32$, $p < .001$, with participants with lower levels of family contact being older than those with more contact. With respect to contact with friends, participants with moderate-to-high levels of contact differed significantly from those with less contact on level of education, $\chi^2(1, n = 112) = 5.76$, $p < .05$, with participants who had lower levels of contact being more likely to have completed high school than those with higher levels of contact.

Relationship Between Social Contact and Social Support

The correlations between amount of social contact and perceived negative and positive social support for diet and exercise behaviors among those with regular contact with family members ($n = 88$) and friends ($n = 95$) are presented in Table 2. Level of social contact was significantly related to only one social support variable: participants with more family contact reported more unhealthy family eating environments, and level of contact with friends was positively and significantly associated with more unhealthy eating environments among friends.

There were consistent positive associations between social support subscales. With respect to exercise behavior subscales, greater criticism related to exercise habits was significantly associated with greater participation in exercise for both family members and friends. Positive associations were also found between two eating behavior subscales: the Encouragement for Healthy Eating sub-scale and the Unhealthy Social Eating Environment subscale. Encouragement for healthy eating was positively associated with participation in exercise and criticism of exercise behaviors from both family and friends. Finally, participation in exercise among friends was positively associated with unhealthy eating environments among friends.

Relationship Between Background and Clinical Characteristics and Social Support

Only one variable was a significant predictor of encouragement for healthy eating behaviors from family members: Nonwhite participants were significantly more likely to receive encouragement from family members for healthy eating than were White participants, $t(86) = -2.37, p < .05$. Two variables were significant predictors of unhealthy family eating environments. Female participants were significantly more likely to be exposed to unhealthy family eating environments than male participants, $F(1, 84) = 6.41, p < .05$, and, after controlling for the amount of family contact, depressive symptoms was a significant predictor of more unhealthy family eating environments, $r(77) = .35, p < .001$.

There were no significant predictors of family participation in exercise. Readiness to change physical activity behaviors was the one significant predictor of criticism from family for exercise behaviors, $r(64) = .29, p < .05$, with participants with greater readiness to change physical activity behaviors significantly more likely to be criticized by family members for exercise behaviors.

None of the demographic, clinical, and health variables were significantly associated with the subscales for exercise behaviors. However, two variables were significantly associated with encouragement from friends for healthy eating. Female participants were significantly more likely to receive encouragement for healthy eating behaviors from friends than male participants, $t(93) = -2.44, p < .05$, and participants with greater readiness to change portion size were significantly more likely receive encouragement from friends for healthy eating behaviors, $r(92) = .291, p < .01$.

The results of the regression analyses predicting social support from family and friends are shown in Table 3. Because it was not necessary to perform regression analysis in the case in which only one variable was significant in the bivariate analyses, multiple regression analysis was performed only for the healthy eating subscales (the Encouragement for Healthy Eating and Unhealthy Social Eating Environment) of which two variables were significant predictors of each subscale. After controlling for the amount of family contact, depression remained significantly associated with unhealthy family eating environments. Participants with higher levels of depressive symptoms reported more unhealthy family eating environments. The model predicted 24% of the variance in unhealthy family eating environments. Readiness to change portion size was a significant predictor of encouragement for healthy eating behaviors from friends. Participants with greater readiness to change portion size were significantly more likely receive encouragement from friends for healthy eating behaviors. The model predicted 20% of the variance in encouragement from friends for healthy eating behaviors.

Discussion

More than three quarters (80%) of the adults with serious mental illness who were enrolled in studies of a healthy lifestyle program reported regular social contact defined as at least twice monthly face-to-face contact with either family members or friends. These levels of contact with natural supports are similar to the rates reported in an earlier survey of middle-aged and older persons with serious mental illness (Aschbrenner, Mueser, Bartels, & Pratt,

2011). The findings suggest that family members and friends may be important potential sources of support for individuals seeking to change their diet and exercise routines, as is the case for many individuals without mental illness.

The finding that higher levels of encouragement for healthy eating behaviors from family was significantly associated with more unhealthy family eating environments raises an intriguing question about what could account for this apparently paradoxical relationship. One possibility is that the methods used to assess social support for eating behaviors led to these contradictory findings. The modified Social Support for Diet and Exercise Behavior Scales includes two subscales: Encouragement for Healthy Eating and Unhealthy Social Eating Environment. The Unhealthy Social Eating Environment subscale is a measure of the respondent's perception of unhealthy eating behaviors of family members and friends in front of the individual, but does not tap verbal statements aimed at discouraging the person from adopting healthier eating habits. The Encouragement for Healthy Eating subscale, on the other hand, includes items reflecting positive verbal statements aimed at encouraging healthy eating habits, but not engagement in behaviors that might be construed as providing encouragement for changing eating behaviors. Thus, a response bias toward endorsing more (or fewer) items on scales in general would lead to this apparently contradictory finding.

Participants with higher levels of depressive symptoms reported more unhealthy family eating environments after controlling for the amount of family contact. Overweight and obese individuals attempting to make a lifestyle change may feel discouraged by unhealthy eating behaviors of family members and thus, experience anxiety, frustration, and a sense of hopelessness in their efforts to change their own behaviors. Because this is a cross-sectional study, it is not possible to determine directionality of effects, therefore, it is also plausible that depressive symptoms predispose individuals to inaccurately perceive the unhealthy behaviors of others as intentionally offensive and discouraging, which could in turn create a barrier to lifestyle changes in diet and exercise.

A greater readiness to change exercise habits was associated with reporting more criticism from family for exercise behaviors. People who engage in more exercise are naturally more prone to being criticized by their family members for those behaviors. The reasons for this criticism are unclear. It is possible that family members resent the time a relative spends exercising, because it takes away from other activities they value, such as cooking and cleaning, or simply creates an inconvenience. Alternatively or additionally, some family members may be critical of a relative who exercises because it is an unpleasant reminder of something they themselves wish they were doing, but are not. Family may also not fully appreciate the benefits of exercise for individuals whose weight places them at significant cardiovascular risk and, thus, could benefit from receiving information about the effect of exercise on improving cardiovascular health, and from exploring fun and interesting physical activities that family members could do together.

Our finding that greater readiness to change portion size was related to receiving more encouragement from friends for healthy eating is consistent with an earlier study, which indicated that level of social support is associated with readiness to change dietary behaviors (Sorensen, Stoddard, & Macario, 1998). There are numerous weight loss programs, most

notably Weight Watchers (Heshka et al., 2003), that are based on peer support for achieving and maintaining goals. Wing and Jeffery (1999) found that both initial weight loss and maintenance of weight loss were greater among participants whose friends joined them in a group weight-loss program than that achieved by individuals who participated alone. Similarly, participants with serious mental illness in healthy lifestyle programs may also benefit from engaging friends as a source of support in making desired dietary change.

A major challenge in healthy lifestyle programs for persons with and without mental illness has been helping participants change health behaviors and sustain them in everyday life. Providers may recommend changes in the living environment that family members and peers could conceivably help implement through prompts, reminders, and reinforcement in daily life. Moreover, interventions are often time limited, while family and social relationships are well suited to support long-term behavior change. Among possible strategies for motivating family members and significant others to support healthy lifestyle changes is offering psychoeducational programs that address the physical health challenges of persons with serious mental illness and teach strategies to support health behavior change, including problem-solving and positive reinforcement. Engaging community partners, such as local fitness facilities, that provide free or discounted memberships to friends and families members of participants in healthy lifestyle interventions can help increase natural support for lifestyle change. In addition, peer mentorship can be used to encourage physical activity and healthy eating in natural settings to promote long-term health behavior change. Peer support is considered a critical factor in helping people recover from mental illness (Davidson et al., 1999), and this study provides additional rationale for the importance of using peer support to promote healthy lifestyles for persons with serious mental illness.

Study Limitations

There were several limitations to this study. First, the fact that the study sample was comprised of participants in research on a healthy lifestyle intervention limits the generalizability of the findings to the broader population of persons with serious mental illness who are not necessarily interested in changing their lifestyle. Also, the racial composition of the sample (80% White) reflects the population of New Hampshire and Massachusetts, where the studies were conducted, and thus the findings may not generalize to more ethnically diverse populations. Another limitation is that the measure of social support for diet and exercise was based on participants' perceptions of support, and did not include ascertainment of family members' perceptions of social support. Finally, the associations reported are cross-sectional, and thus the directionality of the observed effects cannot be determined. Longitudinal research would help to clarify the directionality of these relationships.

Conclusion and Implications for Practice

Little research attention has been given to the potential role of family and friends in supporting health behavior change among persons living with mental illness. However, there is growing evidence supporting the effectiveness of marshaling social support to increase the benefits of weight loss and enhancing diet and increasing physical activity in the general

population. We found that the majority of persons with serious mental illness enrolled in a healthy lifestyle intervention had regular contact with family members and friends who were a source of both positive and negative support for healthy eating and exercise. Engaging natural supports as partners for health promotion may increase the effectiveness of healthy lifestyle interventions for people living with serious mental illness.

Acknowledgments

Supported by the National Institute of Mental Health (Grant Nos. MH078052 and R01MH089811), and an early career investigator award from the Department of Psychiatry at the Geisel School of Medicine at Dartmouth.

References

- Andreasen, NC. Scale for the Assessment of Negative Symptoms (SANS). Iowa City, IA: University of Iowa; 1981.
- Andresen EM, Malmgren JA, Carter WB, Patrick DL. Screening for depression in well older adults: Evaluation of a short form of the CES-D (Center for Epidemiologic Studies Depression Scale). *American Journal of Preventive Medicine*. 1994; 10(2):77–84. [PubMed: 8037935]
- Aschbrenner KA, Mueser KT, Bartels SJ, Pratt SI. Family contact and health status among older adults with serious mental illness. *Psychiatric Rehabilitation Journal*. 2011; 34:295–303. DOI: 10.2975/34.4.2011.295.303 [PubMed: 21459745]
- Beck, AT., Alford, BA. Depression causes and treatment. 2. Philadelphia, PA: University of Pennsylvania Press; 2009.
- Brown S, Birtwistle J, Roe L, Thompson C. The unhealthy lifestyle of people with schizophrenia. *Psychological Medicine*. 1999; 29(3):697–701. [PubMed: 10405091]
- Cabassa LJ, Ezell JM, Lewis-Fernández R. Lifestyle interventions for adults with serious mental illness: A systematic literature review. *Psychiatric Services*. 2010; 61:774–782. DOI: 10.1176/appi.ps.61.8.774 [PubMed: 20675835]
- Centers for Disease Control and Prevention. Physical activity and health: A report of the surgeon general. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion. Retrieved from; 1996. <http://www.cdc.gov/nccdphp/sgr/index.htm>
- Colton CW, Manderscheid RW. Congruencies in increased mortality rates, years of potential life lost, and causes of death among public mental health clients in eight states. *Preventing Chronic Disease*. 2006; 3(2):A42. [PubMed: 16539783]
- Davidson L, Chinman M, Kloos B, Weingarten R, Stayner D, Tebes JK. Peer support among individuals with severe mental illness: A review of the evidence. *Clinical Psychology: Science and Practice*. 1999; 6:165–187. DOI: 10.1093/clipsy/6.2.165
- De Hert M, Correll CU, Bobes J, Cetkovich-Bakmas M, Cohen D, Asai I, ... Leucht S. Physical illness in patients with severe mental disorders. I. Prevalence, impact of medications and disparities in health care. *World Psychiatry*. 2011; 10(1):52–77. [PubMed: 21379357]
- Dunbar SB, Clark PC, Deaton C, Smith AL, De AK, O'Brien MC. Family education and support interventions in heart failure: A pilot study. *Nursing Research*. 2005; 54(3):158–166. [PubMed: 15897791]
- Faulkner G, Soundy AA, Lloyd K. Schizophrenia and weight management: A systematic review of interventions to control weight. *Acta Psychiatrica Scandinavica*. 2003; 108(5):324–332. [PubMed: 14531752]
- Gorin A, Phelan S, Tate D, Sherwood N, Jeffery R, Wing R. Involving support partners in obesity treatment. *Journal of Consulting and Clinical Psychology*. 2005; 73(2):341–343. [PubMed: 15796642]
- Heaney, CA., Israel, BA. Social networks and social support. In: Glanz, K.Rimer, BK., Lewis, FM., editors. *Health behavior and health education: Theory, research and practice*. 3. San Francisco, CA: Jossey-Bass; 2002. p. 185–209.

- Heshka S, Anderson JW, Atkinson RL, Greenway FL, Hill JO, Phinney SD, ... Pi-Sunyer FX. Weight loss with self-help compared with a structured commercial program: A randomized trial. *JAMA: Journal of the American Medical Association*. 2003; 289(14):1792–1798. [PubMed: 12684357]
- Jones DR, Macias C, Barreira PJ, Fisher WH, Hargreaves WA, Harding CM. Prevalence, severity, and co-occurrence of chronic physical health problems of persons with serious mental illness. *Psychiatric Services*. 2004; 55(11):1250–1257. [PubMed: 15534013]
- Keogh KM, White P, Smith SM, McGilloway S, O'Dowd T, Gibney J. Changing illness perceptions in patients with poorly controlled type 2 diabetes, A randomised controlled trial of a family-based intervention: Protocol and pilot study. *BMC Family Practice*. 2007; 8:36. [PubMed: 17597523]
- Korkiakangas EE, Alahuhta MA, Husman PM, Keinanen-Kiukaanniemi S, Taanila AM, Laitinen JH. Motivators and barriers to exercise among adults with a high risk of type 2 diabetes—A qualitative study. *Scandinavian Journal of Caring Sciences*. 2011; 25:62–69. DOI: 10.1111/j.1471-6712.2010.00791.x [PubMed: 20384973]
- Kumanyika S, Economos C. Prevention of obesity: Finding the best evidence. *World Nutrition*. 2011; 2(3):283–299.
- McCallister, L., Fisher, CS. A procedure for surveying personal networks. In: Burt, RS., Minor, MJ., editors. *Applied network analysis: A methodological introduction*. Beverly Hills, CA: Sage; 1983. p. 75-88.
- McCreadie RG. Scottish Schizophrenia Lifestyle Group. Diet, smoking and cardiovascular risk in people with schizophrenia: Descriptive study. *British Journal of Psychiatry*. 2003; 183(12):534–539. [PubMed: 14645025]
- McFarlane AH, Neale KA, Norman GR, Roy RG, Streiner DL. Methodological issues in developing a scale to measure social support. *Schizophrenia Bulletin*. 1981; 7(1):90–100. [PubMed: 7233115]
- National Institutes of Health. Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults—The evidence report. *Obesity Research*. 1998; 6(Suppl 2):51S–209S. [PubMed: 9813653]
- Pitschel-Walz G, Leucht S, Bauml J, Kissling W, Engel RR. The effect of family interventions on relapse and rehospitalization in schizophrenia—A meta-analysis. *Schizophrenia Bulletin*. 2001; 27(1):73–92. [PubMed: 11215551]
- Rouse PC, Ntoumanis N, Duda JL, Jolly K, Williams GC. In the beginning: Role of autonomy support on the motivation, mental health and intentions of participants entering an exercise referral scheme. *Psychology & Health*. 2011; 26:729–749. DOI: 10.1080/08870446.2010.492454 [PubMed: 21827332]
- Sallis JF, Grossman RM, Pinski RB, Patterson TL, Nader PR. The development of scales to measure social support for diet and exercise behaviors. *Preventive Medicine*. 1987; 16:825–836. DOI: 10.1016/0091-7435(87)90022-3 [PubMed: 3432232]
- Sorensen G, Stoddard A, Macario E. Social support and readiness to make dietary changes. *Health Education & Behavior*. 1998; 25(5):586–598. [PubMed: 9768379]
- Strassnig M, Brar JS, Ganguli R. Nutritional assessment of patients with schizophrenia: A preliminary study. *Schizophrenia Bulletin*. 2003; 29(2):393–397. [PubMed: 14552512]
- Sutton K, Logue E, Jarjoura D, Baughman K, Smucker W, Capers C. Assessing dietary and exercise stage of change to optimize weight loss interventions. *Obesity Research*. 2003; 11(5):641–652. [PubMed: 12740454]
- Van Citters AD, Pratt SI, Jue K, Williams G, Miller PT, Xie H, Bartels SJ. A pilot evaluation of the In SHAPE individualized health promotion intervention for adults with mental illness. *Community Mental Health Journal*. 2010; 46:540–552. DOI: 10.1007/s10597-009-9272-x [PubMed: 20012197]
- Van Dyck D, De Greef K, Deforche B, Ruige J, Tudor-Locke CE, Kaufman JM, ... De Bourdeaudhuij I. Mediators of physical activity change in a behavioral modification program for type 2 diabetes patients. *The International Journal of Behavioral Nutrition and Physical Activity*. 2011; 8:105.doi: 10.1186/1479-5868-8-105 [PubMed: 21958233]
- Verhaeghe N, De Maeseneer J, Maes L, Van Heeringen C, Annemans L. Effectiveness and cost-effectiveness of lifestyle interventions on physical activity and eating habits in persons with severe

mental disorders: A systematic review. *The International Journal of Behavioral Nutrition and Physical Activity*. 2011; 8:28.doi: 10.1186/1479-5868-8-28 [PubMed: 21481247]

Voils CI, Yancy WS Jr, Kovac S, Coffman CJ, Weinberger M, Oddone EZ, ... Bosworth HB. Study protocol: Couples Partnering for Lipid Enhancing Strategies (CouPLES)—A randomized, controlled trial. *Trials*. 2009; 10:10.doi: 10.1186/1745-6215-10-10 [PubMed: 19200384]

Wing RR, Jeffery RW. Benefits of recruiting participants with friends and increasing social support for weight loss and maintenance. *Journal of Consulting and Clinical Psychology*. 1999; 67(1):132–138. [PubMed: 10028217]

Wing RR, Marcus MD, Epstein LH, Jawad A. A “family-based” approach to the treatment of obese type II diabetic patients. *Journal of Consulting and Clinical Psychology*. 1991; 59(1):156–162. [PubMed: 2002132]

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 1

Frequency of Contact With Family Members and Friends

Frequency	<u>Contact with family member</u>		<u>Contact with friend</u>	
	<i>n</i>	%	<i>n</i>	%
Daily	40	25.3	30	19.0
At least once weekly	40	25.3	57	36.1
A couple times per month	8	5.1	8	5.1
Once a month	5	3.2	7	4.4
A few times per year	10	6.3	6	3.8
Once per year or less	34	21.5	4	2.5
No contact	21	13.3	46	29.1

Table 2

Correlations Between Social Support for Diet and Exercise Behaviors and Contact With Family Members ($n = 88$ in Upper Right Diagonal) and Friends ($n = 95$ in Lower Left Diagonal) Among Participants With Regular Contact

	Amount of contact	Exercise participation	Exercise criticism	Encouragement healthy eating	Unhealthy eating environment
Amount of contact	1	-.062	-.103	-.027	.288**
Exercise participation	.170	1	.522***	.492***	.111
Exercise criticism	.087	.438***	1	.267*	.234*
Encouragement healthy eating	.035	.637***	.261*	1	.257*
Unhealthy eating environment	.325**	.238*	.120	.186	1

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 3

Linear Regression Models Predicting Social Support for Healthy Eating Habits From Family and Friends

	<i>b</i>	<i>SE b</i>	β
Unhealthy family eating environment ^a			
Intercept	-1.62		
Amount of family contact	1.09	0.41	.27*
Sex	1.64	0.82	.21
Depressive symptoms	0.09	0.03	.31*
Encouragement from friends for healthy eating behaviors ^b			
Intercept	4.19		
Sex	2.31	1.41	.21
Readiness to change food portion size	1.63	0.61	.34*

^a $F = 7.85^{**}$, $R^2 = .24$.^b $F = 6.94^*$, $R^2 = .20$.* $p < .01$.** $p < .001$.