



Are social relationships a healthy influence on obesogenic behaviors among racially/ethnically diverse and socio-economically disadvantaged residents?

Sara L. Tamers^{a,b,*}, Cassandra Okechukwu^a, Jennifer Allen^{b,c}, May Yang^d, Anne Stoddard^d, Reginald Tucker-Seeley^{a,b}, Glorian Sorensen^{a,b}

^a Harvard School of Public Health, Department of Society, Human Development, and Health, Boston, MA, USA

^b Dana-Farber Cancer Institute, Center for Community-Based Research, Boston, MA, USA

^c Harvard Medical School, Department of Medicine, Boston, MA, USA

^d New England Research Institutes, Inc., Watertown, MA, USA

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ABSTRACT

Objective. To examine associations between social support and ties (family, friend, and neighbors) *individually* and *jointly* with diet and physical activity among an ethnically-diverse, low-income population.

Methods. The Health in Common study (2005–2009) was designed to examine risk factors among individuals residing in low-income housing in the Boston, MA area. Cross-sectional surveys ($n = 828$) were administered in residents' homes. Linear/logistic multivariable analyses were employed with clustering of individuals within housing sites controlled as a random effect.

Results. In multivariable analyses, total social support was significantly associated with higher red meat consumption per day ($p = 0.029$). Having more friends was significantly associated with more daily fruit and vegetable intake ($p = 0.007$) and higher levels of daily vigorous physical activity ($p = 0.011$). Those who reported having a greater number of family ties also reported higher daily consumption of sugary drinks ($p = 0.013$) and fast food ($p = 0.011$). More neighbor social ties were associated with more fast food per day ($p = 0.024$).

Conclusions. Social relationships can have both positive and negative associations with health behaviors. Understanding these relationships could help to inform the design of interventions that promote healthy behavior change among vulnerable populations.

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Background

Racial/ethnic minorities of lower socio-economic status (SES) suffer from a disproportionate burden of disease, in part due to elevated risk factors, such as low rates of physical activity (Centers for Disease Control and Prevention, 2008) and unhealthy dietary patterns (Centers for Disease Control and Prevention, 2009). Lower SES groups also face financial, social, and environmental constraints that can hinder healthy behaviors (Chang et al., 2008; Eikenberry and Smith, 2004; Eyler et al., 2002; McIntyre et al., 2003; Parker and Keim, 2004). Given this, enhancing social relationships has been promoted as a promising strategy to help promote healthy lifestyles (Komar-Samardzija et al., 2012; Silva et al., 2012).

Social relationships greatly influence overall health and well-being (Berkman and Kawachi, 2000; Cassel, 1976; House et al., 1988; Mitchell et al., 1983). Individuals who are more socially isolated and less socially integrated suffer more morbidity and mortality (Berkman

and Syme, 1979; Blazer, 1982; Untas et al., 2011). Research on social networks and ties through which support is provided offers some of the most compelling evidence of the benefits of social relationships. These may deter illness onset indirectly by buffering the harmful effects that chronic stress can have on health outcomes (Cassel, 1976; Cobb, 1976; Uchino et al., 1996) and may also impact health through their direct influence on health behaviors (Kelsey et al., 1996).

Studies that have examined the impact of social network ties and support on health behaviors have yielded inconsistent findings. While some show that social relationships can have a 'positive' impact on obesogenic behaviors (Fuemmeler et al., 2006; Hemmingsson et al., 2008; Langenberg et al., 2000) others have suggested that they may have a 'negative' impact on these and related outcomes (Christakis and Fowler, 2007; Kelsey et al., 1996; Schaffer and Lia-Hoagberg, 1997; Tamers et al., 2011a). This potentially 'negative' impact may be even more pronounced among lower SES groups, given already limited access to health-promoting resources.

Research on the mechanisms by which social relationships impact diet and physical activity among vulnerable groups is particularly limited. While studies have generally shown an association between social relationships and health, there is a need to more clearly understand how relationships influence diet and physical

* Corresponding author at: Department of Society, Human Development, and Health, Harvard School of Public Health, 677 Huntington Ave., Boston, MA 02115, USA. Fax: +1 617 632 4858.

E-mail address: sara_tamers@dfci.harvard.edu (S.L. Tamers).

activity. This investigation explored associations between social relationships (support and ties) of family, friends, and neighbors *individually* and *jointly* with diet and physical activity among racially/ethnically diverse lower SES individuals.

Methods

Data source

Data from the Health in Common (HIC) study (2005–2009) were analyzed to examine the relationship between social support and ties and dietary and physical activity behaviors. HIC examined cancer risks among residents of low-income housing (N=20) in greater Boston, MA. The HIC study was approved by the Dana-Farber Cancer Institute Institutional Review Board.

Households were randomly selected within housing developments and individuals were randomly selected within households. To recruit participants, an introductory letter was distributed to all households to describe the study objectives and procedures. The field staff endeavored to recruit each randomly selected household on a minimum of eight occasions. The survey staff randomly selected a resident within each multi-adult household using the Kish method (Kish, 1949); residents of single adult households were designated as the participant.

Setting and sample

The purpose of the resident survey was to assess residents' cancer-related health behaviors, and their perceptions of environmental and social conditions in their housing developments. All households were provided with language-appropriate materials. Of the original 1937 residents that had been randomly selected to participate, 1679 were estimated to be eligible and surveys were successfully administered to 828 residents (49% of those eligible).

Measures

Social support and social ties

Seven items assessed availability of social support and social ties (Heaney and Israel, 1997). For social support, residents were asked if they had family, friends or neighbors that they “feel close to, can talk to about private things or can rely on for help, or make you feel loved and cared for.” For social ties, residents were asked “about how many close relatives, friends, or neighbors like this do you have?” To measure social ties and support from all three sources (i.e., family, friends, and neighbors), two composite measures were developed. One point was awarded if the resident responded “yes” to having family or friend support, or “often/sometimes” to having neighbor support. The final overall social support measure ranged from 0 to 3, with higher scores representing more support. The same scoring system was used for social ties, with higher scores representing more ties (range 0–3).

Dietary behaviors

For dietary outcomes, we used the 14-item PrimeScreen questionnaire (Rifas-Shiman et al., 2001). Individuals were asked how frequently they ate or drank a number of items during the previous week. All dietary factors were calculated as servings per day. Fruit and vegetable servings were created by aggregating six questions: 100% orange or grapefruit juice; other 100% fruit juices; fruit; green salad; baked, boiled or mashed potatoes; and vegetables. Sugar-sweetened beverages or sugary drinks comprised of drinks with added sugar, like regular soda, coffee, or fruit drinks. Sugary snacks included items such as cake, donuts, cookies, pie, or candy. Fast food included meals from establishments such as McDonald's, Wendy's, and Taco Bell. Red meat was derived from two questions that asked about intake of beef, pork or lamb as a main dish as well as processed meats.

Physical activity and sedentary behavior

Two of the questions captured the participants' average duration of vigorous physical activity followed by moderate physical activity that lasted at least 10 min at a time, over the course of the previous week. Sedentary behavior was determined by calculating total hours of sitting time per day, while at work and at home (Craig et al., 2003).

Statistical procedures

Bivariate analyses examined associations between family, friend, and neighbor social support and ties with socio-demographic characteristics, diet, and physical activity. Multivariable linear mixed effects models were constructed for each social support and ties variable with each outcome, controlling for covariates. The clustering of subjects within sites was controlled for by including site as a random effect. Outcomes that were not normally distributed were log-transformed; these included all diet outcomes except for fruit and vegetables, vigorous physical activity, and moderate physical activity. Analyses were run in 2011 using SAS version 9.2 (SAS Institute, Cary, NC).

Results

Descriptive statistics

Table 1 presents characteristics of the HIC sample. An overwhelming majority was female, married, and lived below the poverty line. The mean age was 44 years. Most self-identified as Hispanic, followed by Non-Hispanic Black race/ethnicity. Only a third of the sample had more than a high school diploma.

Over 80% of participants had any family social support, with an average of four family members (ties) providing support. Sixty percent had any social support from friends with an average of three friends (ties) providing support. Fifty percent indicated never/rarely getting social support from neighbors versus often/sometimes, with less than one neighbor (ties) providing support.

The mean intake of fruit and vegetables was 2.6 servings per day. On average, residents consumed roughly half a serving of sugary snacks and less than one sugary drink per day. Mean daily fast food intake was nearly 0 (although over 40% consumed one daily serving of fast food-result not shown). Residents reported consuming half a serving of red meat per day. Participants reported a mean of 0.6 h of daily vigorous physical activity and 4.8 h of total daily sitting.

Diet bivariate and multivariable results

In bivariate analyses (results not shown), higher fruit and vegetable intake was positively associated with friend social ties. Consuming more sugary drinks was associated with lower education, and Hispanic, White or Black race/ethnicity compared to “other” race/ethnicity, while more sugary snacks were associated with younger age and White race/ethnicity. More fast food consumption was associated with more social support and ties, family social ties, friend support, some high school compared to grade school education, younger age, male, Hispanic or “other” race/ethnicity, and not being married. Higher red meat consumption was associated with more overall social support and ties, friend support, neighbor social ties, higher education, and younger age.

When socio-demographic characteristics were controlled (Table 2), overall social support remained significantly associated with more red meat ($p=0.029$). Friend social ties also remained significantly associated with fruit and vegetable consumption ($p=0.0074$), such that residents with more friends were more likely to consume higher quantities of fruit and vegetables. Family social ties were positively associated with more sugary drinks ($p=0.013$) and fast food ($p=0.011$). Neighbor social ties were also associated with more fast food consumption ($p=0.024$).

Table 1

Characteristics of Health in Common study participants (2005–2009), Boston, MA, U.S.A.; total n = 828.

	n	%	Mean	(SD)
Gender				
Female	659	80		
Age				
18–29	153	19		
30–39	218	26		
40–49	169	20		
50–59	145	18		
60+	140	17		
Race/ethnicity				
Hispanic	341	41		
Non-Hispanic White	93	11		
Non-Hispanic Black	316	38		
Other	74	9		
Married/living with partner				
No	550	67		
Education				
Grade school or below	152	21		
Some high school	123	17		
High school	200	27		
More than high school	261	35		
Below poverty line				
Yes	445	58		
Social support ^a	771	93		
Family	688	83		
Friends	499	60		
Neighbors	410	50		
Social ties ^a	742	90		
Family			3.2	(3.4)
Friends			1.7	(2.4)
Neighbors			0.4	(1.1)
Diet ^b				
Fruit and vegetables	828		2.6	(1.6)
Sugary snacks	828		0.4	(0.5)
Sugary drinks	825		0.7	(0.6)
Fast food	827		0.1	(0.2)
Red meat	828		0.4	(0.5)
Physical Activity ^c				
Vigorous	813		0.6	(0.7)
Moderate	819		1.3	(1.1)
Time sitting	814		4.8	(3.7)

Note: n's and percentages may not always add to 828 or 100% due to missing data and rounding.

^a Reflects participants who reported having 'any support' or 'any ties'; means are presented for the number of close relatives, friends, and neighbors.

^b Means reflect daily servings.

^c Means reflect number of hours per day.

Physical activity bivariate and multivariable results

In bivariate analyses (results not shown), more vigorous physical activity was associated with more overall social ties, friend support and ties, higher education, younger age, being male, and not living in poverty. For moderate physical activity, rarely/never having neighbor social support, higher education, younger age, female, and not living in poverty were associated with more activity. Total sitting was associated with more overall social support and ties, friend support, and not living in poverty.

When socio-demographic characteristics were controlled for in the multivariable models (Table 3), only friend social ties remained positively associated with vigorous physical activity ($p = 0.011$).

Discussion

In this study, we sought to understand how diet and physical activity might be associated with two domains of social relationships (support and ties) from three different sources (family, friends, and neighbors). We also explored whether there were individual and joint associations between various sources of support and two health behaviors.

We found no association between overall social support and ties (except in the case of red meat), while more significant findings were found when including the individual items—though inconsistently. This suggests that the association is more nuanced than a summary measure may indicate, lending additional support for the importance of the source of support and ties. Reasons for non-significant findings may be that the social relationships–health association does not operate through these behaviors, that the predictors and outcomes were measured too crudely, or that there was not enough variability in the sample to detect associations.

Few overall associations with social support were found. Having more overall social support from family, friends, and neighbors combined was associated with higher red meat consumption. Having any family social support was marginally associated with higher fruit and vegetable intake. Further research is needed to examine these associations using longitudinal data, as several of these results suggest that social relationships are associated with selective healthy behaviors and other findings suggest that they are associated with certain unhealthy behaviors. A few of the results are in line with other study findings linking social support to healthier diets (Fuemmeler et al., 2006; Langenberg et al., 2000); others suggest a negative association, which is also in line with similar studies with inconsistent findings (Kelsey et al., 1996; Schaffer and Lia-Hoagberg, 1997; Tamers et al., 2011b).

These inconsistencies may in part be due to how social support is defined, measured, and perceived, as well as what sources are captured. Specifically, in addition to the positive aspects of social relationships, evidence also suggests that there may be a 'negative side' in relation to health (Emerson, 1976; Homans, 1974; Rook and Pietromonaco, 1987; Thibaut and Kelley, 1959). This distinction is important because negative social experiences can have an even greater impact on health than positive ones (Kanouse and Hanson, 1972). In addition to 'benefits' derived from social relationships through 'positive' support, there may also exist a 'negative side', which can take the form of adverse stimuli in a social interaction. To this end, a body of research has defined 'negative support' as unpleasant interactions with others that attempt to deter health by shaming, criticizing, or pressuring (Israel et al., 1989; Kelsey et al., 1996; Ray, 1992; Stephens et al., 1987).

Social ties were associated with more of the study outcomes than was social support, although the directions of the effects were not uniformly in the expected direction. Reporting more family ties was associated with a higher intake of sugary drinks and fast food. Having more friend ties was associated with higher fruit and vegetable intake and more vigorous physical activity. Finally, the results also showed that having more neighbor ties providing support was associated with more fast food consumption. In a qualitative study of ethnic/racial minorities of low SES, Eyler et al. (2002) found that multiple social priorities involving a number of sources were reported as time-consuming and difficult, leaving little time or energy for physical activity (Eyler et al., 2002). Lower SES groups are disproportionately burdened with external constraints, including social ones, limiting their ability to lead healthier lifestyles. Thus, another potentially 'negative side' of social relationships, which may be of particular importance among already vulnerable groups, is a 'cost' or 'reward' forgone such as time and effort spent otherwise. Social ties may at times impede healthy behaviors—and also reflect social norms (Christakis and Fowler, 2007)—by creating additional obligations to a network of individuals, resulting in higher stress and less time or effort spent otherwise ('cost').

Limitations and strengths

We must consider several limitations in the interpretation of the study results. Because these data were cross-sectional, we are unable to make causal inferences. Moreover, there are limitations in using

Table 2Association of social support and social ties measures with diet controlling for covariates (2005–2009), Boston, MA, U.S.A.^a

n = 825–828	Fruit and vegetables ^a		Sugary drinks ^c		Sugary snacks ^c		Fast food ^c		Red meat ^c	
	Slope/means ^b	P	Slope/Means ^b	p	Slope/means ^b	p	Slope/Means ^b	p	Slope/Means ^b	p
Overall social support ^d										
0	2.47	0.66	0.66	0.68	0.37	0.89	0.11	0.22	0.46	0.029
1	2.61		0.72		0.42		0.10		0.35	
2	2.62		0.68		0.41		0.12		0.37	
3	2.75		0.74		0.42		0.13		0.45	
Family social support										
No	2.39	0.06	0.65	0.27	0.38	0.41	0.09	0.08	0.38	0.68
Yes	2.70		0.72		0.42		0.12		0.40	
Friend social support										
No	2.69	0.59	0.69	0.47	0.41	0.95	0.11	0.43	0.36	0.06
Yes	2.62		0.73		0.41		0.12		0.42	
Neighbor social support										
rarely/never	2.58	0.27	0.72	0.72	0.41	0.75	0.11	0.17	0.38	0.29
often/sometimes	2.71		0.70		0.42		0.13		0.41	
Overall social ties ^d										
0	2.54	0.93	0.71	0.71	0.45	0.59	0.09	0.08	0.42	0.07
1	2.63		0.68		0.38		0.10		0.35	
2	2.68		0.71		0.43		0.13		0.40	
3	2.65		0.78		0.41		0.13		0.47	
Family social ties	0.03	0.14	0.01	0.013	0.01	0.14	0.01	0.011	0.00	0.38
Friend social ties	0.07	0.007	0.00	0.95	0.00	0.89	0.00	0.70	0.00	0.54
Neighbor social ties	0.07	0.23	0.00	0.74	0.01	0.42	0.01	0.024	0.01	0.15

^a Site, education, age, gender, race, poverty index, and marital status controlled for in all models.^a Linear regression models with dependent variable being predicted by the predictor and demographics.^b Beta coefficients presented for continuous predictors and means are presented for categorical predictors. For log-transformed measures, the transformed means/coefficients were translated back to their original scale by taking the antilog. A positive beta coefficient indicates a positive relationship i.e. an increase in the predictor is associated with higher daily servings.^c Linear regression models with log-transformed dependent variable being predicted by the predictor and demographics.^d Composite measure that includes all three sources of social support or ties.**Table 3**Association of social support and ties measures with physical activity controlling for covariates (2005–2009), Boston, MA U.S.A.^a

n = 813–819	Vigorous activity ^a		Moderate activity ^a		Total sitting ^b	
	Slope/means ^c	P	Slope/means ^c	p	Slope/means ^c	p
Overall social support ^d						
0	0.51	0.21	0.99	0.62	5.06	0.15
1	0.52		1.02		5.02	
2	0.50		1.08		5.75	
3	0.59		0.98		5.68	
Family social support						
No	0.52	0.84	0.96	0.31	4.99	0.09
Yes	0.53		1.04		5.61	
Friend social support						
No	0.49	0.11	1.03	0.97	5.29	0.19
Yes	0.56		1.03		5.67	
Neighbor social support						
Rarely/never	0.51	0.27	1.07	0.25	5.38	0.36
Often/sometimes	0.55		0.99		5.64	
Overall social ties ^d						
0	0.50	0.14	0.95	0.83	5.17	0.28
1	0.48		1.02		5.24	
2	0.58		1.05		5.66	
3	0.54		1.05		5.92	
Family social ties	0.01	0.09	0.01	0.11	0.05	0.25
Friend social ties	0.01	0.011	0.01	0.45	0.03	0.58
Neighbor social ties	0.02	0.09	0.02	0.12	−0.03	0.81

^a Site, education, age, gender, race, poverty index, and marital status controlled for in all models.^a Linear regression models with log-transformed dependent variable being predicted by the predictor and demographics.^b Linear regression models with dependent variable being predicted by the predictor and demographics.^c Beta coefficients presented for continuous predictors and means are presented for categorical predictors. For log-transformed measures, the transformed means/coefficients were translated back to their original scale by taking the antilog. A positive beta coefficient indicates a positive relationship i.e. an increase in the predictor is associated with more physical activity.^d Composite measure that includes all three sources of social support or ties.

self-reported measures of both dietary intake and physical activity, such as social desirability. There are also other influential characteristics of social relationships (network components) that were unmeasured in the HIC study. Finally, the social support measures used do not distinguish between support that may foster ‘healthy’ versus ‘unhealthy’ practices; that said, our aim was to explore the relationship between a general sense of perceived support and these outcomes.

This study has important strengths. We assessed a large number of dietary and physical activity outcomes that are validated markers of obesogenic behaviors. To our knowledge, this is one of few analyses to examine the impact of multiple sources of ties and support individually and jointly with both diet and physical activity among ethnically/diverse and lower SES individuals.

Conclusions

Social relationships can serve important functions as well as have an opposite effect on healthy lifestyles. In addition to ‘rewards’ received from social support and ties, there may also be a ‘cost’, especially experienced among lower SES populations, given the number of additional constraints they face in leading healthier lifestyles. This distinction requires additional investigation among vulnerable groups, and is a critical point of research for interventions that harness social relationships as a means of supporting behavior change. Future longitudinal studies are needed to establish causality and provide more in-depth data on the perceived impact of social relationships.

Conflict of interest statement

None of the authors has any financial disclosures.

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