HHS Public Access
Author manuscript
J Epidemiol Community Health. Author manuscript; available in PMC 2015 November 01.

Published in final edited form as:
J Epidemiol Community Health. 2014 November ; 68(11): 1020–1026. doi:10.1136/jech-2014-204009.

Perceived Neighborhood Social Cohesion and Myocardial Infarction

Eric S. Kim, MS, **Armani M. Hawes**, and **Jacqui Smith, PhD**
Department of Psychology (E.S.K, A.H., J.S.), University of Michigan, Ann Arbor; Institute for Social Research (J.S.), University of Michigan, Ann Arbor

Abstract

Background—The main strategy for alleviating heart disease has been to target individuals and encourage them to change their health behaviors. Though important, emphasis on individuals has diverted focus and responsibility away from neighborhood characteristics, which also strongly influence people's behaviors. Although a growing body of research has repeatedly demonstrated strong associations between neighborhood characteristics and cardiovascular health, it has typically focused on negative neighborhood characteristics. Only a few studies have examined the potential health enhancing effects of positive neighborhood characteristics, such as perceived neighborhood social cohesion.

Methods—Using multiple logistic regression models, we tested whether higher perceived neighborhood social cohesion was associated with lower incidence of myocardial infarction. Prospective data from the Health and Retirement Study—a nationally representative panel study of American adults over the age of 50—were used to analyze 5,276 participants with no history of heart disease. Respondents were tracked for four years and analyses adjusted for relevant sociodemographic, behavioral, biological, and psychosocial factors.

Results—In a model that adjusted for age, gender, race, marital status, education, and total wealth, each standard deviation increase in perceived neighborhood social cohesion was

Correspondence and reprint requests to: Eric S. Kim, Department of Psychology, 530 Church Street, University of Michigan, Ann Arbor, MI 48109-1043, USA; phone; 914) 826-4477; kimeric@umich.edu.

Disclosures
There are no conflicts of interest.

Contribution Statement
Eric Kim had full access to all data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. The authors agree to allow the journal to review the data if requested. All authors contributed to the design of the study and interpretation of the findings, and have read, commented on, and approved the manuscript.

Competing Interest
None declared

Role of the Sponsor
The funding sources had no influence on the design or conduct of the study; collection, management, analysis or interpretation of the data; or preparation, review, or approval of the manuscript. Eric S. Kim had full access to all data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. All authors contributed to the design of the study and interpretation of the findings, and have read, commented on, and approved the manuscript.

associated with a 22% reduced odds of myocardial infarction (OR = 0.78, 95% CI, 0.63–0.94. The association between perceived neighborhood social cohesion and myocardial infarction remained even after adjusting for behavioral, biological, and psychosocial covariates.

Conclusions—Higher perceived neighborhood social cohesion may have a protective effect against myocardial infarction.

Keywords

neighborhood social cohesion; aging; myocardial infarction; epidemiology; public health

---

Heart disease has been the leading cause of death in the United States for the past 80 years.[1] The main strategy for alleviating heart disease has been trying to convince individuals to change their health behaviors. Though important, emphasis on individuals has diverted focus and responsibility away from higher order factors, such as neighborhood-level factors. A growing body of literature suggests that neighborhood characteristics impact cardiovascular health.[2] Research examining neighborhood factors and health, however, has historically emphasized how negative neighborhood characteristics (e.g., density of fast food restaurants, violence, noise, traffic, poor air quality, vandalism, drug use, and physical decay) harm health.[2,3] Only a few studies have examined the possible role positive neighborhood characteristics, such as neighborhood social cohesion, have in enhancing health.[4]

Neighborhood social cohesion is the perceived degree of connectedness between and among neighbors and their willingness to intervene for the common good.[5] It is also characterized by the degree to which a resident: feels secure, feels connected to the area, and trusts its inhabitants. The construct is distinct from individual-level social networks and support because it characterizes the entire community and impacts the whole neighborhood, regardless of an individual's characteristics.[2]

Two pioneering studies explored the association between positive neighborhood social climate and cardiovascular events. In one study, approximately 7,800 Swedish adults over the age of 45 were tracked for four years. Higher neighborhood social climate was linked with lower rates of myocardial infarction.[6] The study, however, used a one-item measure of neighborhood social interaction that may not have captured the multifaceted nature of the construct of interest in this study. Another study followed 2.8 million Swedish adults (aged 45–74) for two years. The researchers found that lower neighborhood social capital was associated with higher incidence of coronary heart disease.[7] However, neighborhood social capital, was operationalized as the percentage of people in a neighborhood that voted, and also may not have accurately captured the construct of interest in this study.

Although the exact mechanisms responsible for the associations between neighborhood social cohesion and enhanced cardiovascular health are unknown, studies have linked neighborhood social cohesion with intermediate outcomes that predict cardiovascular events. For example, higher neighborhood social cohesion is associated with more physical activity,[8,9] such as walking,[10] and less coronary artery calcification.[11] Neighborhood social cohesion has also been linked with reduced risk of related outcomes such as stroke.[12,13]

We built upon the important research of the two studies examining the link between positive neighborhood social climate and cardiovascular events by using a four-item measure of neighborhood social cohesion that was carefully constructed based on empirical, conceptual, and theoretical evidence. We also controlled for a more comprehensive array of covariates including those that were sociodemographic, behavioral, biological, and psychosocial in nature. Several individual-level psychological factors that may distort a person's perception of neighborhood social cohesion were also controlled for (e.g., a depressed person may artificially decrease their neighborhood social cohesion rating because of their condition). Also, psychological factors are important to control for because several have been linked with an altered risk of cardiovascular events.[14,15,16,17] We further controlled for two measures of individual-level social engagement because these factors may confound neighborhood social cohesion ratings.

We also shifted the focus from aggregate levels of neighborhood social cohesion to individual perceptions of neighborhood social cohesion. Neighborhood social cohesion is often measured as an aggregated group indicator or analyzed using multilevel modeling. There are several good reasons to do so, but there are also benefits to examining this construct at the individual level. For example, the boundaries of a neighborhood are difficult to identify. They are often identified by researchers (using Zip codes, census tracts, or census block groups) but often differ from a resident's perception of neighborhood boundaries.[18,19] Therefore, misidentifying neighborhoods in a multilevel model, and clustering together respondents who do not consider themselves neighbors, may skew results. Researchers discuss how neighborhood-level measures of social cohesion often have poor agreement among inhabitants in the same neighborhood.[18,20] Further, aggregated neighborhood-level data would have required a larger number of respondents in each neighborhood than were available in our sample.

Based on our question of interest, conceptual grounds, practical reasons, and the merits of supplementing one type of modeling (typically multilevel models in this line of research) with other types of justifiable modeling, we named our predictor variable *perceived* neighborhood social cohesion. We use this term to indicate that neighborhood social cohesion was investigated at the individual-level, rather than at the aggregated neighborhood-level.

In this study, we hypothesized that higher perceived neighborhood social cohesion would be prospectively associated with a lower risk of myocardial infarction. Because the risk of cardiovascular events increases with age, the examination of factors associated with cardiovascular health is particularly important for the expanding segment of older adults facing the threat of declining health and rising health care costs. Therefore, we used the Health and Retirement Study to test our hypothesis.

METHODS

Participants

The Health and Retirement Study (HRS) began in 1992 and has surveyed more than 22,000 people biannually since then. It is a nationally representative panel study of American adults over the age of 50 and the age of respondents in this study ranged from 51 to 105. In 2006, the HRS added a detailed section that assessed several psychosocial factors. Therefore, we used 2006 as our baseline and that is also when all of the covariate data were assessed. Incident myocardial infarction was assessed in follow-up waves (2008), (2010), and exit surveys. For respondents who died during the follow-up period, exit interviews were completed by knowledgeable informants. The University of Michigan's Institute for Social Research is responsible for the study and provides extensive documentation about the protocol, instrumentation, sampling strategy, and statistical weighting procedures.[21] HRS is sponsored by the National Institute on Aging (grant number NIA U01AG009740) and is conducted by the University of Michigan.[21,22] The present study used de-identified and publicly available data, therefore the Institutional Review Board at the University of Michigan exempted it from review.

Procedure

In 2006, approximately 50% of the HRS respondents were selected for an enhanced face-to-face interview. At the end of the interview, respondents were asked to complete a self-report leave-behind psychological questionnaire, which they then returned by mail. Among people who were interviewed, the response rate for the leave-behind questionnaire was 90%, resulting in 7,168 respondents. We excluded 1816 participants who self-reported a history of heart disease at baseline, and 76 participants who self-identified themselves in a race/ethnicity category other than Caucasian, Black, or Hispanic. These 76 participants were dropped because there were not enough cases of myocardial infarction to power the analyses for this group. The final sample consisted of 5,276 respondents.

Measures

Myocardial infarction Outcome Measurement—Incidence of myocardial infarction was defined as a first nonfatal or fatal myocardial infarction based on self or proxy-report of a physician's diagnosis using the 2008, 2010, and exit surveys. Myocardial infarctions that are assessed through self-report correspond imperfectly with medical records. Although imperfect, the high agreement between self-reported myocardial infarctions and hospital records has been well documented.[23–26] For example, in a recent longitudinal study of 41,438 Spanish adults, self-reported myocardial infarctions were compared against hospital records. The sensitivity of self-reported acute myocardial infarction was 97.7%, with a positive predictive value of 60.7%, and a specificity of 99.7%.[23] Also, self-report data are particularly precise for acute events, like myocardial infarction.[24]

Perceived Neighborhood Social Cohesion Measurement—Perceived neighborhood social cohesion was measured using a four-item scale developed and tested for use in two nationally representative studies of older adults (the HRS and the English Longitudinal Study of Aging).[27] The items were derived from widely used and widely cited neighborhood cohesion scales that have been validated.[10,28–30] The scale assesses the perceived social cohesion and perceived social trust of the respondent's neighborhood. Using a 7-point Likert scale, respondents specified the degree to which they endorsed the following four items:"I really feel part of this area," "If you were in trouble, there are lots of people in this area who would help you," "Most people in this area can be trusted," and

"Most people in this area are friendly." The scores were averaged and higher scores reflected higher perceived neighborhood social cohesion (Cronbach's $\alpha = 0.83$). The perceived neighborhood social cohesion scores were then standardized (M=0, SD =1) so that the outcome odds ratio could be interpreted as the result of one standard deviation increase in perceived neighborhood social cohesion.

Covariates Measurement—Potential confounders or pathways linking perceived neighborhood social cohesion with risk of myocardial infarction were all assessed at baseline. Potential covariates included sociodemographic, behavioral, biological, and psychosocial factors that past research suggests are relevant to myocardial infarction risk.[15,31] Potential confounders included the following sociodemographic variables: age, gender, race/ethnicity (Caucasian, African-American, Hispanic, Other), marital status (married/not married), educational attainment (no degree, GED or high school diploma, college degree or higher), and total wealth (<25,000; 25,000–124,999; 125,000–299,999; 300,000–649,999; >650,000—based on quintiles of the score distribution in this sample).

Psychosocial factors that might confound the primary association of interest included depression, anxiety, cynical hostility, positive affect, social participation, and social integration. Further information about how these constructs were measured can be found in the Supplemental Methods section and the HRS Psychosocial Manual.[27]

Potential behavioral and biological pathway covariates that might link neighborhood social cohesion to myocardial infarction were also considered. Behavioral covariates included smoking status (never, former, current), frequency of moderate (e.g., gardening, dancing, walking at a moderate pace) and vigorous exercise (e.g., running, swimming, aerobics) reported as never, 1–4 times per month, more than once a week), and frequency of alcohol consumption (abstinent, less than 1 or 2 days per month, 1 to 2 days per week, and more than 3 days per week).

Biological covariates included self-reported weight in pounds, converted into kilograms and height in inches, converted into meters (used to calculate body mass index [BMI] according to kg/m2); hypertension and diabetes (each yes/no based on self-report of a doctor's diagnosis). BMI was categorized as 18.5–24.9 (normal), 25–29.9 (overweight), ≥ 30 (obese). There is no "underweight" category because it contained only 1.51% of the sample and was unstable in statistical analyses, therefore it was collapsed with the "normal" category.

Statistical Analysis

We conducted multiple logistic regression analyses to test if perceived neighborhood social cohesion was associated with a reduced risk of myocardial infarction. Logistic regression was used because we did not have detailed information about the date each myocardial infarction occurred. Odds ratios, however, offer a good approximation of hazards ratios in this study for several reasons: the follow-up time was short, the outcome incidence ratio was low (probability of myocardial infarction was 2.81% in our sample),[32] the risk ratio was moderate in size, and the sample size was large. The potential impact of covariates on the relationship between perceived neighborhood social cohesion and myocardial infarction was estimated by adjusting for blocks of covariates.

We first examined a minimally adjusted model and then considered the impact that adding potentially confounding demographic factors had on the association between perceived neighborhood social cohesion and myocardial infarction. We then considered the impact of biological or behavioral pathways in a third and a fourth model. In models 3 and 4, an observed reduction in the association between perceived neighborhood social cohesion and myocardial infarction, after adding either biological or behavioral covariates, may be consistent with the possibility that each block of variables represents a potential pathway linking perceived neighborhood social cohesion to risk of myocardial infarction. Model 1 adjusted for only age and gender. Model 2, the core model, included: age, gender, race/ethnicity, marital status, educational degree, and total wealth. Three additional models were created; Model 3 – core model + health behaviors (smoking status, exercise, alcohol frequency); and Model 4 – core model + biological factors (hypertension, diabetes, BMI).

Some additional analyses were performed. First, we examined if associations found between perceived neighborhood social cohesion and myocardial infarction were maintained even when controlling for depression, anxiety, cynical hostility, optimism, positive affect, and two factors that tapped into individual-level social engagement (social participation and social integration). Using the core model, we added each psychosocial factor one at a time. Then three additional models were created: Model 5 – core model + negative psychological factors (depression, anxiety, cynical hostility); Model 6 – core model + positive psychological factors (optimism, positive affect); Model 7 – core model + individual-level social engagement factors (social participation and social integration); and finally a Model 8, which included all covariates.

In addition, we created quartiles of perceived neighborhood social cohesion based on the score distribution in this sample, in order to consider the possibility of threshold or discontinuous effects. Finally, we tested a potential interaction between perceived neighborhood social cohesion and gender to assess possible gender differences in the association of interest.

Logits were converted into odds ratios (ORs) for ease of interpretation. Given that the probability of myocardial infarction was rare in our sample (2.81%), our reported ORs can be regarded as relative risks.[33] All results in this study were weighted, using HRS sampling weights to account for the complex multistage probability survey design, which includes individual non-response, stratification, sample clustering, and additional post-stratification using Stata (StataCorp. 2013. *Stata Statistical Software: Release 13*. College Station, TX: StataCorp LP).

Missing Data Analysis

The item non-response rate was less than 1% for all study variables. These missing data, however, were distributed across variables, resulting in a 5.29% loss of respondents when complete-case analyses were attempted. Therefore, to examine the impact of missing data on our results and to obtain less biased estimates, multiple imputation procedures were used to impute missing data.[34] Results were largely the same between the original and imputed datasets. Therefore, we used the dataset with multiple imputations for all analyses reported in this study.[34]

RESULTS

Descriptive Statistics

The average age of respondents at baseline was 70 years (SD = 10.05)—ages ranged from 51 to 105 years (47% of the sample was 70 or older). The majority of respondents were women (62%) and married (62%). Most had a high school degree (55%) or attended some college (20%). Respondents identified as being Caucasian (70%), African-American (17%), or Hispanic (12%). Among the 5,276 participants, 148 respondents (66 women and 82 men) had a myocardial infarction over the four-year follow-up. Table 1 contains further descriptive statistics about the covariates. Supplementary Table 1 shows the correlations among the continuous and binary factors in our study, and Supplementary Table 2 shows the distribution of perceived neighborhood social cohesion scores among the categorical factors.

Perceived Neighborhood Social Cohesion and Myocardial Infarction Incidence

Associations between perceived neighborhood social cohesion and myocardial infarction were highly consistent across all five models. In the core model (Model 2, Table 2), each standard deviation increase in perceived neighborhood social cohesion was associated with a multivariate-adjusted OR of 0.78 for myocardial infarction (95% CI, 0.63–0.94). When considering each block of potential pathway covariates, the association between perceived neighborhood social cohesion and myocardial infarction were somewhat attenuated, but the association remained significant or marginally significant in all the models (Models 2–8, Table 2). See Supplementary Table 3 for more detailed information about these results.

When examining quartiles of perceived neighborhood social cohesion, the findings suggested a threshold relationship (Table 3). For example, in the core model (Model 2, Table 3) relative to people with the lowest neighborhood cohesion, people with moderately low neighborhood cohesion had a somewhat reduced risk of myocardial infarction (O.R. = 0.66, 95% CI, 0.35–1.26), while people with moderately high neighborhood cohesion had an even lower risk of myocardial infarction (O.R. = 0.56, 95% CI, 0.30–1.05). However, people with the highest neighborhood cohesion did not have a substantially lower risk of myocardial infarction when compared against people with moderately high neighborhood cohesion (O.R. = 0.55, 95% CI, 0.32–0.96). Adjusting for additional covariates made the associations between perceived neighborhood social cohesion and myocardial infarction marginally significant in some models (Table 3).

Considering Additional Psychosocial Factors

Adding each psychosocial factor sequentially to the base model contributed to a modest decrease in the association between perceived neighborhood social cohesion and myocardial infarction but the association between perceived neighborhood social cohesion and myocardial infarction remained significant in each of these analyses. When all three negative psychological factors were simultaneously added to the core model, the association between perceived neighborhood social cohesion and myocardial infarction was marginally significant (OR = 0.79, 95% CI, 0.63–1.00; Model 5, Table 2). The association between perceived neighborhood social cohesion and myocardial infarction also remained significant when positive psychological factors (OR = 0.79, 95% CI, 0.65–0.96; Model 6, Table 2) or individual-level social engagement factors (OR = 0.78, 95% CI, 0.64–0.96; Model 7, Table 2) were added to the core model. A fully adjusted model that controlled for every covariate showed a marginally significant association (OR = 0.82, 95% CI, 0.66–1.02; Model 8, Table 2). Finally, a potential interaction between perceived neighborhood social cohesion and myocardial infarction was formally tested and the result was not significant (p = .469).

DISCUSSION

In a prospective and nationally representative sample of 5,276 U.S. adults over the age of 50, who had no history of heart disease at baseline, perceived neighborhood social cohesion was associated with a reduced likelihood of incident myocardial infarction over the four-year follow-up period. After adjusting for sociodemographic factors, each standard deviation increase in perceived neighborhood social cohesion was associated with a 22% reduced risk in incident myocardial infarction. Even after further adjustments for behavioral, biological, and psychosocial factors the association between perceived neighborhood social cohesion and myocardial infarction persisted. Our results are consistent with previous studies that found associations between positive neighborhood social climate and cardiovascular events.[6,7] Although adjusting for potential behavioral and biological pathways variables attenuated the parameter estimates, the magnitude of attenuation was modest. This suggests that other mechanisms may be at work. Further, we observed a threshold relationship. After a moderately high amount of perceived neighborhood social cohesion, additional neighborhood cohesion did not appear to reduce the risk of myocardial infarction.

Several mechanisms may explain the link between neighborhood social cohesion and cardiovascular health. Studies consistently report links between higher individual-level social support and better health outcomes, and perceived neighborhood social cohesion may work through similar mechanisms. For instance, greater perceived social support—one's perception of access to social support—has been linked with better cardiovascular health.[35–39] Perceived neighborhood social cohesion could be a type of social support that is available in the neighborhood social environment outside the realm of family and friends. Further, this additional type of neighborhood-level social support may create and reinforce neighborhood norms. These norms may then impact the behavior of neighborhood residents by creating a system of incentives for adopting and maintaining certain behaviors.[2,10,40] Further research examining the potential mechanisms between neighborhood-level factors and cardiovascular health are needed. Our study has limitations and strengths. Some risk factors, such as family history of cardiovascular disease and genetic vulnerability were not available for analysis. We were also unable to examine many ethnic minority groups (other than Blacks or Hispanics) due to sample size issues. Studies examining the relationship between neighborhood cohesion and health across different ethnic groups report mixed results.[41,42] Therefore, the associations examined in this study should be further researched in more diverse populations, particularly because such a small percentage of the psychosocial literature addresses ethnic minority groups sufficiently.[43] Further, we do not know how long a respondent has been living in a particular neighborhood. A respondent could have moved from a low to highly cohesive neighborhood (or vice versa) and such a move would impact the associations examined in this study. Future research should examine this issue further. Additionally, myocardial infarctions that are assessed through self-report correspond imperfectly with medical records. Although imperfect, the high correlation between self-reported myocardial infarctions and hospital records has been well documented and self-reported data are particularly precise for acute events, like myocardial infarction.[23–26] Finally, only four years of HRS follow-up data were available at the time of analysis. The risk of myocardial infarction increases rapidly with age and 47% our study sample was 70 years old and over. Therefore, we thought four years was a long enough follow-up period for this study. However, the mechanisms that link perceived neighborhood social cohesion with myocardial infarction likely develop over the course of many years, and we recognize that a longer follow-up is ideal. Further, the strength of the association between perceived neighborhood social cohesion and myocardial infarction may change over a longer follow-up period. Therefore this study should be replicated with longer follow-up periods. With time, future waves of data collection and future releases of HRS data will allow researchers to examine longer follow-up periods.

Despite these limitations, our study has several strengths. First, we controlled for a wide range of important covariates that were sociodemographic, behavioral, biological, and psychosocial in nature. Second, we used a large nationally representative sample. Third, we controlled for several psychosocial factors that may skew a person's neighborhood social cohesion ratings. Finally, we tried minimizing the potential impact of missing data by using a multiple imputation technique, which has been shown to provide more accurate estimates of associations than other methods of handling missing data.[34] If future work replicates our findings, this line of research may justify future research which examines the potential health benefits of policy and public-health interventions that bolster the social infrastructure of neighborhoods.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

We would like to thank the editors and the anonymous reviewers for their valuable comments and suggestions.

Funding Statement

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

References

1. Roger VL, Go AS, Lloyd-Jones DM, et al. Heart disease and stroke statistics—2012 update. Circulation. 2012; 125:e2–e220. [PubMed: 22179539]
2. Diez-Roux AV, Kershaw K, Lisabeth L. Neighborhoods and cardiovascular risk: Beyond individual-level risk factors. Curr Cardiovasc Risk Rep. 2008; 2:175–180.
3. Diez-Roux AV. Residential environments and cardiovascular risk. J Urban Health. 2003; 80:569–589. [PubMed: 14709706]
4. Diez-Roux AV, Mair C. Neighborhoods and health. Ann NY Acad Sci. 2010; 1186:125–145. [PubMed: 20201871]
5. McNeill LH, Kreuter MW, Subramanian SV. Social environment and physical activity: A review of concepts and evidence. Soc Sci Med. 2006; 63:1011–1022. [PubMed: 16650513]

6. Chaix B, Lindström M, Rosvall M, et al. Neighbourhood social interactions and risk of acute myocardial infarction. J Epidemiol Community Health. 2008; 62:62–68. [PubMed: 18079335]
7. Sundquist J, Johansson SE, Yang M, et al. Low linking social capital as a predictor of coronary heart disease in Sweden: A cohort study of 2.8 million people. Soc Sci Med. 2006; 62:954–963. [PubMed: 16081195]
8. Fisher KJ, Li F, Michael Y, et al. Neighborhood-level influences on physical activity among older adults: A multilevel analysis. J Aging Phys Act. 2004; 12:45. [PubMed: 15211020]
9. Cradock AL, Kawachi I, Colditz GA, et al. Neighborhood social cohesion and youth participation in physical activity in Chicago. Soc Sci Med. 2009; 68:427–435. [PubMed: 19036490]
10. Mendes de Leon CF, Cagney KA, Bienias JL, et al. Neighborhood social cohesion and disorder in relation to walking in community-dwelling older adults: A multilevel analysis. J Aging Health. 2009; 21:155–171. [PubMed: 19144973]
11. Kim D, Roux AVD, Kiefe CI, et al. Do neighborhood socioeconomic deprivation and low social cohesion predict coronary calcification? The CARDIA study. Am J Epimiol. 2010; 172:288–298.
12. Clark CJ, Guo H, Lunos S, et al. Neighborhood cohesion is associated with reduced risk of stroke mortality. Stroke. 2011; 42:1212–1217. [PubMed: 21493914]
13. Kim ES, Park N, Peterson C. Perceived neighborhood social cohesion and stroke. Soc Sci Med. 2013; 97:49–55. [PubMed: 24161088]
14. Boehm JK, Kubzansky LD. The heart’s content: The association between positive psychological well-being and cardiovascular health. Psychol Bull. 2012; 138:655–691. [PubMed: 22506752]
15. Rozanski A, Blumenthal JA, Davidson KW, et al. The epidemiology, pathophysiology, and management of psychosocial risk factors in cardiac practice: The emerging field of behavioral cardiology. Am Coll Cardiol. 2005; 45:637–651.
16. Kim ES, Park N, Peterson C. Dispositional optimism protects older adults from stroke: The Health and Retirement Study. Stroke. 2011; 42:2855–2859. [PubMed: 21778446]
17. Kim ES, Smith J, Kubzansky LD. A Prospective Study of the Association Between Dispositional Optimism and Incident Heart Failure. Circulation: Heart Failure. 2014; 7:394–400. [PubMed: 24647117]
18. Cagney KA, Glass TA, Skarupski KA, et al. Neighborhood-level cohesion and disorder: Measurement and validation in two older adult urban populations. J Gerontol B Psychol Sci Soc Sci. 2009; 64:415–424. [PubMed: 19255089]
19. Kawachi I, Subramanian SV. Neighbourhood influences on health. J Epidemiol Community Health. 2007; 61:3–4. [PubMed: 17183006]
20. Stafford M, Bartley M, Sacker A, et al. Measuring the social environment: Social cohesion and material deprivation in English and Scottish neighbourhoods. Env Plan. 2003; 35:1459–1475.
21. Wallace RB, Herzog AR. Overview of the health measures in the Health and Retirement Study. J Hum Resour. 1995; 30:S84–S107.
22. Health and Retirement Study. Produced and distributed by the University of Michigan with funding from the National Institute on Aging (grant number NIA U01AG009740). Ann Arbor, MI: 2014. (HRS Data Files; 2006, 2008, 2010) public use dataset.
23. Machón M, Arriola L, Larrañaga N, et al. Validity of self-reported prevalent cases of stroke and acute myocardial infarction in the Spanish cohort of the EPIC study. J Epidemiol Community Health. 2013; 67:71–75. [PubMed: 22577182]
24. Okura Y, Urban LH, Mahoney DW, et al. Agreement between self-report questionnaires and medical record data was substantial for diabetes, hypertension, myocardial infarction and stroke but not for heart failure. J Clin Epidemiol. 2004; 57:1096–1103. [PubMed: 15528061]
25. Heckbert SR, Kooperberg C, Safford MM, et al. Comparison of self-report, hospital discharge codes, and adjudication of cardiovascular events in the Women’s Health Initiative. Am J Epidemiol. 2004; 160:1152–1158. [PubMed: 15583367]
26. Klungel OH, de Boer A, Paes AH, et al. Cardiovascular diseases and risk factors in a population-based study in the Netherlands: Agreement between questionnaire information and medical records. Neth J Med. 1999; 55:177–183. [PubMed: 10555434]
27. Smith, J.; Fisher, G.; Ryan, L., et al. Psychosocial and lifestyle questionnaire. Survey Research Center, Institute for Social Research; 2013.

28. Sampson RJ, Raudenbush SW, Earls F. Neighborhoods and violent crime: A multilevel study of collective efficacy. Science. 1997; 277:918–924. [PubMed: 9252316]
29. Ross CE, Mirowsky J. Disorder and decay: The concept and measurement of perceived neighborhood disorder. Urban Affairs Review. 1999; 34:412–432.
30. Stafford M, Bartley M, Sacker A, Marmot M, Wilkinson R, Boreham R, Thomas R. Measuring the social environment: social cohesion and material deprivation in English and Scottish neighbourhoods. Environment and Planning A. 2003; 35:1459–1475.
31. Yusuf S, Hawken S, Ôunpuu S, et al. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): Case-control study. Lancet. 2004; 364:937–952. [PubMed: 15364185]
32. Callas PW, Pastides H, Hosmer DW. Empirical comparisons of proportional hazards, poisson, and logistic regression modeling of occupational cohort data. Am J Ind Med. 1998; 33:33–47. [PubMed: 9408527]
33. Van Belle, G. Statistical rules of thumb. Hoboken, NJ: Wiley; 2008. Epidemiology; p. 113-142.
34. Little, RJA.; Rubin, DB. Statistical analysis with missing data. Hoboken, NJ: Wiley; 2002. Bayes and multiple imputation; p. 200-222.
35. Berkman LF, Leo-Summers L, Horwitz RI. Emotional support and survival after myocardial infarction a prospective, population-based study of the elderly. Ann Intern Med. 1992; 117:1003–1009. [PubMed: 1443968]
36. Brummett BH, Barefoot JC, Siegler IC, et al. Characteristics of socially isolated patients with coronary artery disease who are at elevated risk for mortality. Psychosom Med. 2001; 63:267–272. [PubMed: 11292274]
37. Williams RB, Barefoot JC, Califf RM, et al. Prognostic importance of social and economic resources among medically treated patients with angiographically documented coronary artery disease. JAMA. 1992; 267:520–524. [PubMed: 1729574]
38. Orth-Gomér K, Rosengren A, Wilhelmsen L. Lack of social support and incidence of coronary heart disease in middle-aged Swedish men. Psychosom Med. 1993; 55:37–43. [PubMed: 8446739]
39. Frasure-Smith N, Lespérance F, Gravel G, et al. Social support, depression, and mortality during the first year after myocardial infarction. Circulation. 2000; 101:1919–1924. [PubMed: 10779457]
40. Kawachi, I.; Berkman, L. Social Epidemiology. New York, NY: Oxford University Press; Social cohesion, social capital, and health; p. 174-190.
41. Lochner KA, Kawachi I, Brennan RT, et al. Social capital and neighborhood mortality rates in Chicago. Soc Sci Med. 2003; 56:1797–1805. [PubMed: 12639596]
42. Mujahid MS, Roux AVD, Morenoff JD, et al. Neighborhood characteristics and hypertension. Epidemiology. 2008; 19:590–598. [PubMed: 18480733]
43. Hartmann WE, Kim ES, Kim JHJ, et al. In search of cultural diversity, revisited: Recent publication trends in cross-cultural and ethnic minority psychology. Rev Gen Psychol. 2013; 17:243–254.

Author Manuscript

Author Manuscript

Author Manuscript

What is already known on this subject?

- Past research examining the associations between neighborhood-level factors and health, has largely focused on how negative neighborhood factors are associated with poorer health.
- However, a growing body of research shows that positive neighborhood-level factors, such as neighborhood social cohesion, is associated with an array of positive outcomes including better: mental health, health behaviors, and physical health.

What this study adds?

- To our knowledge, this is the first study to prospectively examine the association between perceived neighborhood social cohesion and myocardial infarction.
- Higher perceived neighborhood social cohesion was associated with lower myocardial infarction risk, even after adjusting for a wide range of covariates.
- If future research replicates these findings, more neighborhood-level public health approaches that target neighborhood social cohesion may be warranted.

Table 1

Distribution of covariates (n = 5,276)*

Measure	
Mean Age (SD)	69.53 (10.05)
Female	3271 (61.99)
Married Status	3264 (61.87)
Race/Ethnicity	
Caucasian	3712 (70.39)
African-American	918 (17.40)
Hispanic	644 (12.21)
Education	
< High School	1315 (24.93)
High School	2889 (54.76)
≥ College	1072 (20.31)
Total Wealth	
1st Quintile	1090 (20.67)
2nd Quintile	1029 (19.50)
3rd Quintile	1091 (20.67)
4th Quintile	1013 (19.21)
5th Quintile	1053 (19.95)
Smoking Status	
Never	2349 (44.52)
Former Smoker	2236 (42.38)
Current Smoker	691 (13.10)
Exercise	
Never	3483 (66.02)
1–4 times per month	743 (14.09)
More than 1x per week	1050 (19.89)
Alcohol Frequency	
Never	2779 (52.67)
<1 per month	852 (16.14)
1–2 per week	805 (15.26)
3+ per week	840 (15.93)
Hypertension	2768 (52.47)
Diabetes	981 (18.60)
BMI, kg/m^2	419 (22.13)
Normal (18.5–24.9)	1556 (29.48)
Overweight (25–29.9)	2138 (40.52)
Obese (≥ 30)	1582 (29.99)

*Unless otherwise noted, values are number of participants (percentage)

Table 2

Odds ratios for the association between perceived neighborhood social cohesion and myocardial infarction

Model	Covariates	Adjusted logistic regression (95% CI)	P-value
1	Age + gender	0.73 (0.59–0.90)	0.004
2	Demographic*	0.78 (0.63–0.94)	0.012
3	Demographic* + health behaviors†	0.77 (0.63–0.95)	0.015
4	Demographic* + biological factors‡	0.78 (0.63–0.96)	0.019
5	Demographic* + negative psych factors§	0.79 (0.63–1.00)	0.057
6	Demographic* + positive psych factors¶	0.79 (0.65–0.96)	0.021
7	Demographic* + social engagement||	0.78 (0.64–0.96)	0.015
8	All covariates**	0.82 (0.66–1.02)	0.070

*Demographic factors: age, gender, race/ethnicity, marital status, education level, total wealth

†Health behaviors: smoking, exercise, alcohol frequency

‡Biological factors: hypertension, diabetes, BMI

§Negative psychological factors: depression, anxiety, cynical hostility

¶Positive psychological factors: optimism, positive affect

||Social engagement: social participation, social integration

**All covariates: age, gender, race/ethnicity, marital status, education level, total wealth, smoking, exercise, alcohol frequency, hypertension, diabetes, BMI, depression, anxiety, cynical hostility, optimism, positive affect, social participation, social integration

Table 3

Odds ratios for the association between perceived neighborhood social cohesion myocardial infarction by quartiles

Model	Quartile Group	Adjusted logistic regression (95% CI)
1†	Low (Reference Group)	1.00
	Low-Moderate	0.62 (0.32–1.21)
	Moderate-High	0.49 (0.26–0.95)*
	High	0.49 (0.28–0.85)*
2‡	Low (Reference Group)	1.00
	Low-Moderate	0.66 (0.35–1.26)
	Moderate-High	0.56 (0.30–1.05)
	High	0.55 (0.32–0.96)*
3‡§	Low (Reference Group)	1.00
	Low-Moderate	0.68 (0.36–1.29)
	Moderate-High	0.57 (0.31–1.07)
	High	0.57 (0.33–0.98)*
4†¶	Low (Reference Group)	1.00
	Low-Moderate	0.66 (0.35–1.25)
	Moderate-High	0.58 (0.31–1.09)
	High	0.58 (0.33–1.01)
5†‖	Low (Reference Group)	1.00
	Low-Moderate	0.67 (0.35–1.28)
	Moderate-High	0.60 (0.30–1.17)
	High	0.62 (0.33–1.14)
6†**	Low (Reference Group)	1.00
	Low-Moderate	0.67 (0.36–1.28)
	Moderate-High	0.59 (0.32–1.09)
	High	0.62 (0.37–1.01)
7†† †	Low (Reference Group)	1.00
	Low-Moderate	0.68 (0.35–1.29)
	Moderate-High	0.58 (0.30–1.09)
	High	0.58 (0.34–1.01)
8‡‡	Low (Reference Group)	1.00
	Low-Moderate	0.69 (0.36–1.30)
	Moderate-High	0.64 (0.33–0.24)
	High	0.69 (0.40–1.20)

[*] p<.05

[†] Age + gender

[‡] Demographic factors: age, gender, race/ethnicity, marital status, education level, total wealth

[§] Health behaviors: smoking, exercise, alcohol frequency

¶Biological factors: hypertension, diabetes, BMI

||Negative psychological factors: depression, anxiety, cynical hostility

**Positive psychological factors: optimism, positive affect

††Social engagement: social participation, social integration

‡‡All covariates: age, gender, race/ethnicity, marital status, education level, total wealth, smoking, exercise, alcohol frequency, hypertension, diabetes, BMI, depression, anxiety, cynical hostility, optimism, positive affect, social participation, social integration