Neighborhood Perceptions, Self-rated Health, and Personality Traits:

Evidence from Japan

Takashi Oshio[†]

Institute of Economic Research, Hitotsubashi University

and

Kunio Urakawa

Graduate School of Economics, Kyushu University

[†] **CORRESPONDENCE**

2-1 Naka, Kunitachi, Tokyo 183-8603, Japan. E-mail: oshio@ier.hit-u.ac.jp.

ABSTRACT

Although earlier studies have demonstrated an association between perceived neighborhood characteristics and self-rated health, these studies did not control for the psychological characteristics of participants, an important consideration when using self-reported data. In this study, we examined how self-rated health is associated with perceived neighborhood characteristics after controlling for personality traits as well as other individual- and area-level covariates. We employed multilevel analysis using microdata collected from a nationwide Internet survey in Japan in 2011 ($N = 8,139$). When controlling for personality traits, we observed that the odds for reporting poor health in response to negative neighborhood assessments declined but remained highly significant. We obtained similar results when additionally controlling for sense of coherence (SOC) or replacing personality traits with it. We also found no effect of personality traits or SOC on the sensitivity of self-rated health with negative neighborhood assessments.

KEYWORDS

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INTRODUCTION

Many empirical studies have investigated how psychological aspects of neighborhood perceptions affect individual health.[1-8] They have demonstrated that residing in neighborhoods perceived to be characterized by social disorder and socioeconomic disadvantages is associated with higher levels of depression, distress, and more broadly, a poorer assessment of overall health. However, we cannot rule out that the observed association between neighborhood perceptions and self-rated health may be at least partly spurious, because these two self-reported measures are highly subjective.[5, 9] For example, we can expect people who are more nervous to report lower satisfaction with both the neighborhood and their own health, regardless of their actual conditions. If that is the case, we cannot draw any reliable implications for public health policy from the observations.

In this study, we examined whether and to what extent self-rated health is associated with perceived neighborhood characteristics (i.e., dissatisfaction with the neighborhood as a whole, neighborhood safety, and trust in neighbors) after controlling for personality traits and other individual- and area-level background variables. Utilizing the Big Five Inventory (BFI), we focused on five personality dimensions: extroversion, agreeableness, conscientiousness, neuroticism, and openness.[10] We also used Antonovsky's sense of coherence (SOC), which is considered a key feature of human information processing in resolving conflict and enduring stress.[11, 12] Studies have shown that health and neighborhood perceptions are associated with personality traits and SOC,[13-28] suggesting that these two psychological measures may at least partly account for the observed association between subjective assessments of neighborhood and health. Studies have also investigated the relationships between personality traits and SOC and found that these two concepts are closely correlated but not fully substitutable with each other.[19, 20] Hence, we ran regression models that both separately and jointly controlled for them.

To analyze the association between assessments of neighborhood and health, we had to control for objective neighborhood characteristics and individual-level covariates using a

multilevel framework.[3, 21] We aggregated individual survey data of subjective neighborhood assessments by averaging for measurement errors across individuals.[9, 22] This approach is expected to construct a valid—albeit not entirely free from same source bias—proxy of objective neighborhood characteristics, which was not available from the survey.

Our empirical analysis is based on microdata collected from a nationwide Internet survey in Japan. Recently, the country's widening income inequality has been attracting attention and researchers have begun investigating the association between regional deprivation and inequality on health in Japan.[23-24] However, neighborhood perceptions or their psychological components have not been studied explicitly.

METHODS

Study Sample

Our analysis drew on a survey that was designed and implemented in February 2011. The survey provided a range of information regarding an individual's subjective assessment of his/her own well-being, personality traits, sociodemographic and socioeconomic status, and perceived neighborhood characteristics. To ensure that the sample is representative of the actual population of Japan, we constructed targeted proportions of 15 population groups (representing a matrix of 5 age groups and 3 household income classes) on the basis of official statistics. Using these targeted proportions of the sample, we sent the questionnaires via the Internet to 16,930 randomly selected monitors who were registered in the members list of a private Internet-survey institute. The response rate was 68.3%.

The original data were geographically clustered in small areas, which could be identified by seven-digit postal codes. The first three digits of the postal code correspond to the location of each local municipality—the smallest unit of local administration. In the original dataset, the total number of the three-digit areas was 885 and the number of respondents who lived in the same three-digit area ranged from 1 to 100 ($M = 23.4$, $SD = 17.1$). We focused on areas with 10

respondents or more and utilized their area-level aggregated assessments of neighborhood perceptions in the subsequent analysis.

Variables

A key dependent variable was self-rated health, which has been shown to be a reliable indicator of objective health status.[25, 26] The survey presented the question, "How do you describe the current state of your health?" and asked respondents to choose an option on a 5-point scale ("healthy, "somewhat healthy", "average," "somewhat poor," and "poor"). We constructed a binary variable of poor self-rated health by allocating a value of 1 to the bottom two responses ("somewhat poor" and "poor"), which comprised 21.4% of the entire sample.

For the independent variables, we considered three types of perceived neighborhood characteristics: neighborhood dissatisfaction, dissatisfaction with neighborhood safety, and dissatisfaction with trust in neighbors. The first was a comprehensive measure of neighborhood perception, while the latter two were proxies of perceived social disorder and interpersonal conditions in neighborhood, respectively. The survey questioned the respondents on their satisfaction with their neighborhoods on a 5-point scale. We allocated a value of 1 to the bottom two responses ("dissatisfied" and "somewhat dissatisfied"), which accounted for 14.3% of all responses. The survey also asked the respondents about their assessments of neighborhood safety and trust in neighbors on 5-point scale each. We allocated a value of 1 to the bottom two responses for dissatisfaction with neighborhood safety (which accounted for 22.8% of all responses) and to the bottom response for dissatisfaction with trust in neighbors (32.9%).

Regarding personality, we constructed five binary variables for each of the five traits. The survey asked respondents to rate their agreement with each of the 44 BFI items on a 6-point scale. For each trait, we summed up the indices and constructed four binary variables for each quartile of the sum.

To measure SOC, the survey asked the respondents to rate their agreement with 29

statements on a 6-point scale.[27] Each statement reflected one of three SOC components: comprehensibility, manageability, and meaningfulness of life. We summed up the indices and constructed five binary variables for each quartile of the sum.

We also controlled for a number of individual- and area-level variables. At the individual level, we controlled for sociodemographic and socioeconomic factors including sex, age (20s, 30s, 40s, 50s, and 60s or above), marital status (married, unmarried, divorced, or widowed), educational attainment (graduated from junior high school or below, high school, and junior college or above), household income, and occupational status (regularly employed (including managers), non-regularly employed, self-employed, student, and not working (including housework)). Regarding household incomes, the respondents had to select their own income levels as well as those of their spouses, if any, from among 14 income bands. We calculated the median for each band and defined the sum of a respondent and his/her spouse's income as the household income. We then calculated the equivalized income by dividing the household income by the root of the number of household members. Finally, we constructed five binary variables for the income quintiles.

At the area level, we aggregated individual survey data of subjective neighborhood assessments by postal-code area. The survey questioned the respondents on their assessments of 18 aspects of their neighborhood—including quality of public service, convenience for commuting, and access to medical services—on a 5-point scale. We took the mean of reported scores for the respondents who live in the same area with the same three-digit postal codes. To obtain reliable area-level measures, we focused on the areas with 10 respondents or more who had no missing variables.

After separating the responses that included missing key variables, and those who lived in an area of less than 10 respondents, the number of observations used in the empirical analysis was 8,139 (4,660 men; 3,479 women), representing 70.4% of the original sample. The basic features of the sample are summarized in Table 1.

Analytical Strategy

We employed multilevel logistic regression models, in which we controlled for sociodemographic and socioeconomic factors at the individual-level and collective area-level conditions. We started with Model 1, which included poor self-rated health by neighborhood dissatisfaction. In Model 2, we added personality traits. In Model 3, we replaced personality traits with SOC. Finally, we included both personality traits and SOC in Model 4. We repeated the same regressions for dissatisfaction with neighborhood safety and trust in neighbors.

We also examined how the sensitivity of self-rated health to perceived neighborhood characteristics is affected by personality traits or SOC. We added six interaction terms with the fourth (highest) quartiles of each component of the five personality traits and SOC to Model 4. We focused on the level and statistical significance of the odds ratio of each interaction term.

RESULTS

Figure 1 shows the proportion of respondents reporting poor health and negative perceptions of neighborhood by neuroticism quartiles. We observed that higher levels of neuroticism corresponded to higher proportions of both poor self-rated health and negative neighborhood assessments. Although not included here, we also found that higher levels of extroversion, agreeableness, and conscientiousness tended to reduce the proportions of negative assessments of both health and neighborhood perceptions, while openness had no clear relations with them.

Figure 2 shows the proportion of respondents reporting poor health and negative perceptions of neighborhood by SOC. We observed that higher levels of SOC were associated with smaller proportions of poor self-rated health and negative neighborhood perceptions. Like Figure 1, it points to the possibility of positive but spurious correlations between negative neighborhood perceptions and poor health.

Table 2 presents the predicted associations between poor self-rated health and perceived neighborhood dissatisfaction, controlling for personality traits and SOC. The results for

individual- and area-level covariates are not reported to save space. As seen in the table, Model 1 (which did not control for personality traits or SOC) shows that poor self-rated health was strongly associated with neighborhood dissatisfaction, OR 1.63 ($p < 0.001$, 95% CI 1.41–1.88).

When controlling for personality traits (Model 2), the odds ratio for poor self-rated health dropped to 1.41 but was still a highly significant association ($p < 0.001$, 95% CI 1.21–1.64). We also found that higher levels of extroversion and conscientiousness decreased the odds for poor self-rated health, while higher levels of neuroticism increased it. By replacing personality traits with SOC in Model 3, the odds ratio for poor self-rated health decreased to 1.35 (lower than in Model 2) but was still highly significant ($p < 0.01$, 95% CI 1.16–1.57). We also found a strong negative correlation between SOC and poor self-rated health. Finally, in Model 4 (which included both personality traits and SOC), the odds ratio decreased further to 1.25, but remained significant ($p < 0.01$, 95% CI 1.07–1.46). The different results in the statistical significance of each component of personality traits changed in models 2 and 4 suggest a correlation between personality traits and SOC.

Table 3 compares the associations between poor self-rated health and three types of negative neighborhood perceptions. After controlling for personality traits and/or SOC, the odds for poor self-rated health decreased but remained significant across all measures. We also observed that controlling for SOC did not affect the association between self-rated health and dissatisfaction with neighborhood safety. However, a different effect was observed for dissatisfaction with trust in neighbors, suggesting that SOC may be a more relevant measure of interpersonal relationships.

Finally, Table 4 assesses how the interaction with personality traits and SOC affects the sensitivity of self-rated health to neighborhood perceptions. We observed no significant association between self-rated health and almost all interaction terms. We also conducted analysis that separated each interaction term, but results remained virtually unchanged (not reported in the table).

DISCUSSION AND CONCLUSION

Using data from Japan, we examined how self-rated health is associated with perceived neighborhood characteristics, after controlling for personality traits and other individual- and area-level variables. Two key findings emerged. First, after controlling for personality traits and/or SOC, a significant association was found between self-rated health and neighborhood perceptions. Although the strength of the association decreased with the addition of personality traits and SOC, it nevertheless remained significant. Second, the interaction of neighborhood perceptions with personality traits and/or SOC did not affect associations with self-rated health.

These results confirm that self-rated health is associated with perceived neighborhood characteristics, and this association appears unaffected by the subjectivity of the measures or the psychological traits of the individuals. Hence, we can conclude that the associations found in earlier studies are unlikely to be fully accounted for by an individual's psychological traits. The findings of this study imply that that social policies to promote a psychological sense of community by improving neighborhood amenities, strengthening social control, and promoting favorable community networks can potentially improve social well-being.

We recognize, however, that this study has several limitations. The microdata used in the empirical analysis are subject to the same biases inherent in any survey. In addition, the area-level averages of neighborhood perceptions are not entirely free from the same source bias referred to earlier, especially for the areas where the number of surveyed residents is small. Most importantly, our analysis draws on a cross-sectional dataset, which makes it almost impossible to identify causality between measures. We need to conduct additional research to examine the relationship between neighborhood perceptions, health, and personality traits by considering their simultaneous relationships. We assumed that personality traits and SOC are exogenous, but that (perceived) neighborhood characteristics may change them. It has been found that SOC mediates the impact of socioeconomic status on health,[28-30] pointing to the possibility that SOC acts as a mediator between neighborhood perceptions and health. We also

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need a framework of dynamic analysis for making residential location decisions endogenously.[31]

References

1. Latkin CA, Curry AD. Stressful neighborhoods and depression: A prospective study of the impact of neighborhood disorder. *J Health Soc Behav*. 2003; 44(1): 34–44.

2. Hill DT, Ross CE, Angel RJ. Neighborhood disorder, psychophysiological distress, and health. *J Health Soc Behav*. 2005; 46(2): 170–186.

3. Wen M, Hawkley LC, Cacioppo JT. Objective and perceived neighborhood environment, individual SES and psychosocial factors, and self-rated health: An analysis of older adults in Cook County, Illinois. *Soc Sci Med*. 2006; 63(10): 2575–2590.

4. Gary TL, Stark SA, La Veist TA. Neighborhood characteristics and mental health among African Americans and Whites living in a racially integrated urban community. *Health Place*. 2007; 13(2): 569–575.

5. Echeverria SM, Diez-Roux AV, Shea S, Borrell L, Jackson S. Associations of neighborhood problems and neighborhood social cohesion with mental health and health behaviors: The multi-ethnic study of atherosclerosis. *Health Place*. 2008; 14(4): 853–865.

6. Kim D. Blues from the neighborhood? Neighborhood characteristics and depression. *Epidemiol Rev*. 2008; 30(4): 101–117.

7. Hill DT, Burdette AM, Hale L. Neighborhood disorder, sleep quality, and psychological distress: Testing a model of structural amplification. *Health Place*. 2009; 15(4): 1006–1013.

8. Ross CE, Mirowsky J. Neighborhood disorder, subjective alienation, and distress. *J Health Soc Behav*. 2009; 50(1): 49–64.

9. Diez-Roux AV. Neighborhoods and health: Where are we and where do we go from here? *Revue d'Epidémiologie et de Santé Publique*. 2007; 55(1): 13–31.

10. Benet-Martínez V, John OP. *Los Cinco Grandes* across cultures and ethnic groups: Multitrait multimethod analyses of the Big Five in Spanish and English. *Journal of J Pers Soc Psychol*. 1998; 75(3): 729–750.

11. Antonovsky A. *Health, stress and coping: New perspectives on mental and physical well-being*. San Francisco, CA: Jossey-Bass; 1979.

12. Antonovsky, A. *Unraveling the mystery of health: How people manage stress and stay well*. San Francisco, CA: Jossey-Bass; 1987.

13. Goodwin R, Engstrom G. Personality and the perception of health in the general population. *Psychol Med*. 2002; 32(2): 325–332.

14. Eriksson M. Lindström B. Antonovsky's sense of coherence scale and the relation with health: A systematic review. *J Epidemiol Community Health*. 2005; 60(5): 376–381.

15. Richardson CG, Ratner PA. Sense of coherence as a moderator of the effects of stressful life events on health. *J Epidemiol Community Health*. 2005; 59(11): 979–984.

16. Sairenchi T, Haruyama Y, Ishikawa Y, Wada K, Kimura K, Muto T. Sense of coherence as a predictor of onset of depression among Japanese workers: a cohort study. *BMC Public Health*. 2011; 11: 205.

17. Löckenhoff CE, Terracciano A, Ferrucci L, Costa PT Jr. Five-factor personality traits and age trajectories of self-rated health: The role of question framing. *J Pers*. 2011. doi:10.1111/j.1467-6494.2011.00724.x

18. Fagg J, Curtis S, Clark C, Congdon P, Stansfeld SA. Neighbourhood perceptions among inner-city adolescents: Relationships with their individual characteristics and with independently assessed neighbourhood conditions. *Journal of Environmental Psychology*. 2008; 28(2): 128–142.

19. Langius A, Björvell H, Antonovsky A. The sense of coherence concept and its relation to personality traits in Swedish samples. *Scand J Caring Sci*. 1992; 6(3): 165–71.

20. Feldt T, Metsäpelto R-L, Kinnunen U, Pulkkinen L. Sense of coherence and five-factor approach to personality. *European Psychologist*. 2007; 12(3): 165–172.

21. Weden MM, Richard M, Carpiano RM, Robert SA. Subjective and objective neighborhood characteristics and adult health. *Soc Sci Med*. 2008; 66(6): 1256–1270.

22. Mujahid MS, Diez-Roux AV, Morenoff JD, Raghunathan T. Assessing the measurement properties of neighborhood scales: From psychometrics to ecometrics, *Am J Epidemiol*, 2007; 165(8): 858–867.

23. Ichida, Y, Kondo K., Hirai H, Hanibuchi T, Yoshikawa G, Murata C. Social capital, income inequality and self-rated health in Chita Peninsula, Japan: A multilevel analysis of older people in 25 communities. *Soc Sci Med.* 2009; 69(4): 489–499.

24. Oshio T, Kobayashi M. Income inequality, area-level poverty, perceived aversion to inequality, and self-rated health in Japan. *Soc Sci Med*. 2009; 69(3): 317–326.

25. Wilcox VL, Kasl SV, Idler EL. Self-rated health and physical disability in elderly survivors of a major medical event. *J Gerontol B Psychol Sci Soc Sci*. 1996; 51B(2), S96–S104.

26. Idler EL, Benyamini Y. Self-rated health and mortality: A review of twenty-seven community studies. *J Health Soc Behav*. 1997; 38(1): 21–37.

27. Antonovsky A. The structure and properties of the sense of coherence scale. *Soc Sci Med.* 1993; 36(6): 725–733.

28. Suominen S, Blomberc H, Helenius H, Koskenvuo M. Sense of coherence and health: Does the association depend on resistance resources? A study of 3115 adults in Finland. *Psychology Health*. 1999; 14(5): 937–948.

29. Kivimäki M, Elovainio M, Vahtera J, Nurmi JE, Feldt T, Keltikangas-Järvinen L. et al. Sense of coherence as a mediator between hostility and health: Seven-year prospective study on female employees. *J Psychosom Res*. 2002; 52(4): 239–247.

30. Ing JD, Reutter L. Socioeconomic status, sense of coherence and health in Canadian women. *Can J Public Health*.2003; 94(3): 224–228.

31. Boone-Heinonen J, Diez-Roux AV, Kiefe CI, Lewis CE, Guilkey DK, Gordon-Larsen P. Neighborhood socioeconomic status predictors of physical activity through young to middle adulthood: The CARDIA study. *Soc Sci Med.* 2011; 72(5): 641–649.

Figure 1. Proportion of respondents reporting negative perceptions of neighborhood by neuroticism quartiles
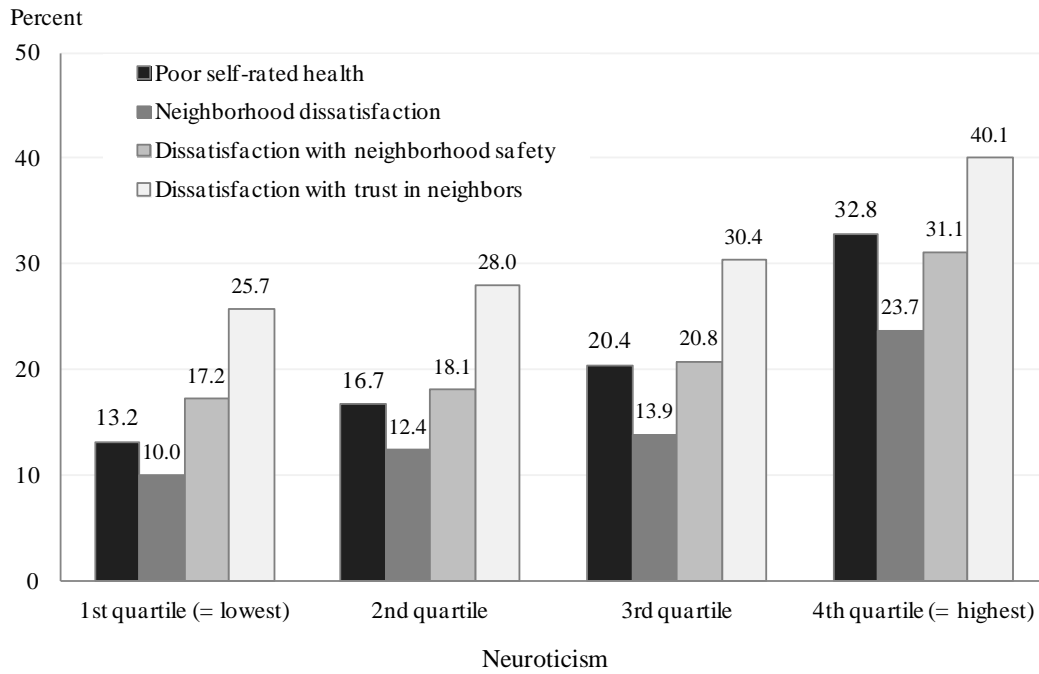
Figure 2. Proportion of respondents reporting negative perceptions of neighborhood by sense of coherence (SOC) quartiles
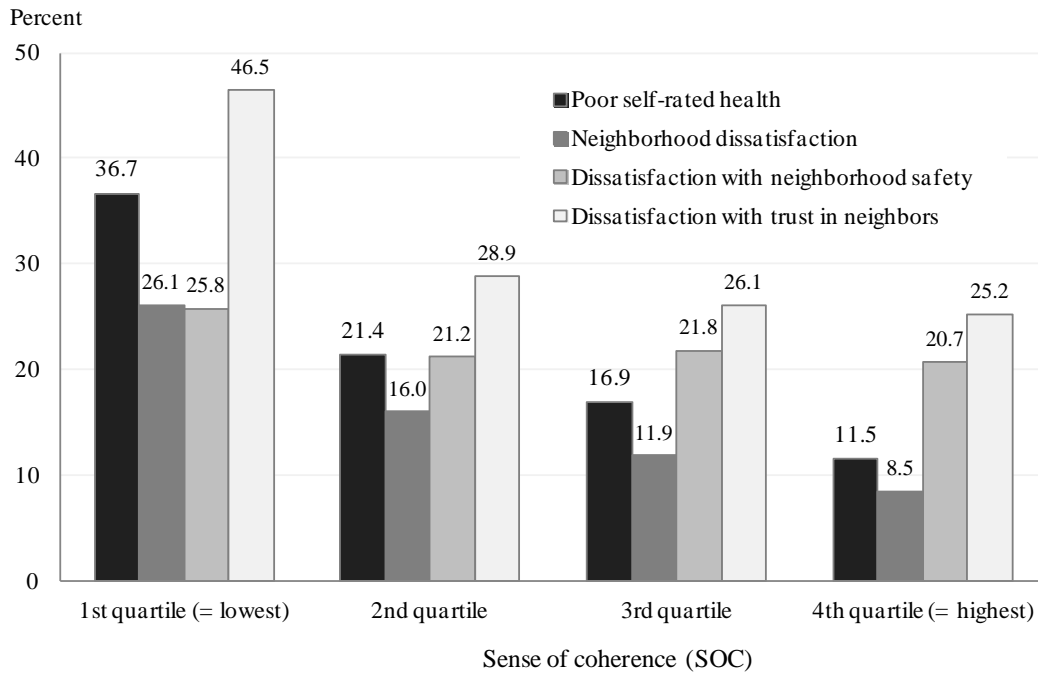
Table 1. Basic features of the sample

		All	Men	Women
Proportion (%)				
Poor self-rated health		21.4	23.2	19.1
Neighborhood dissatisfaction		14.3	13.2	15.7
Dissatisfaction with trust in neighbors		32.9	31.2	35.2
Dissatisfaction with safety		22.8	19.4	27.4
Married		63.6	65.5	61.0
Single		29.8	29.2	30.6
Divorced		5.3	4.3	6.6
Widowed		1.4	1.0	1.9
Graduated from junior high school		2.1	2.2	2.0
Graduated from high school		24.4	22.9	26.4
Graduated from junior college or above		73.5	74.8	71.6
Regularly employed		41.0	55.3	21.9
Non-regularly employed		19.9	13.5	28.5
Self-employed		7.5	10.3	3.6
Student		4.1	3.8	4.3
Other		27.6	17.1	41.7
Household income ('000 yen)	Mean	3,343	3,515	3,113
	SD	2,396	2,473	2,268
Age	Mean	45.1	47.9	41.3
	SD	14.2	14.4	13.0
Number of observations		8,139	4,660	3,479

Table 2. Estimated association between perceived neighborhood characteristics and poor self-rated health, controlling for personality traits, SOC, and other control variables: A multilevel analysis[a]

	OR (95% CI)	OR (95% CI)	OR (95% CI)
Model 1			
Controlling for:	None		
Neighborhood dissatisfaction	1.63 (1.41, 1.88)***		
Model	2	3	4
Controlling for:	Personality	SOC	Personality + SOC
Neighborhood dissatisfaction	1.41 (1.21, 1.64)***	1.35 (1.16, 1.57)***	1.25 (1.07, 1.46)**
Personality traits[b]			
Extroversion			
Q2	0.94 (0.80, 1.10)		1.13 (0.96, 1.34)
Q3	0.84 (0.71, 1.00)***		1.14 (0.96, 1.36)
Q4 (= highest)	0.82 (0.69, 0.97)*		1.28 (1.06, 1.53)**
Agreeableness			
Q2	0.95 (0.80, 1.12)		1.05 (0.89, 1.25)
Q3	0.99 (0.84, 1.17)		1.19 (1.00, 1.41)*
Q4 (= highest)	1.01 (0.84, 1.21)		1.33 (1.10, 1.62)**
Conscientiousness			
Q2	0.84 (0.72, 0.90)*		0.88 (0.74, 1.03)
Q3	0.97 (0.81, 1.15)		1.08 (0.91, 1.29)
Q4 (= highest)	0.81 (0.67, 0.97)*		0.94 (0.78, 1.14)
Neuroticism			
Q2	1.28 (1.05, 1.55)*		1.14 (0.93, 1.39)
Q3	1.68 (1.38, 2.04)***		1.41 (1.16, 1.73)***
Q4 (= highest)	3.15 (2.58, 3.85)***		2.36 (1.92, 2.90)***
Openness			
Q2	0.95 (0.80, 1.13)		1.04 (0.87, 1.24)
Q3	1.05 (0.89, 1.23)		1.23 (1.05, 1.45)*
Q4 (= highest)	1.27 (1.07, 1.51)**		1.69 (1.41, 2.02)***
SOC[b]			
Q2		0.47 (0.41, 0.55)***	0.52 (0.44, 0.61)***
Q3		0.36 (0.31, 0.42)***	0.36 (0.30, 0.43)***

Q4 (= highest)	0.23 (0.20, 0.28)[***]	0.21 (0.17, 0.27)[***]

[a]Eighteen types of regional characteristics and six types of individual features (sex, age, marital status, educational attainment, household income, and occupational status) were also controlled for.

[b]The lowest quartile (Q1) was used as a reference group for each category.

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Table 3. Estimated association of poor self-rated health with three types of perceived neighborhood characteristics, controlling for personality traits, SOC, and other control variables[a]

		Neighborhood dissatisfaction	Dissatisfaction with neighborhood safety	Dissatisfaction with trust in neighbors
		OR (95% CI)	OR (95% CI)	OR (95% CI)
Model	Controlling for:			
1	None	1.63 (1.41, 1.88)***	1.78 (1.57, 2.02)***	1.49 (1.32, 1.67)***
2	Personality traits	1.41 (1.21, 1.64)***	1.60 (1.41, 1.82)***	1.36 (1.20, 1.53)***
3	SOC	1.35 (1.16, 1.57)***	1.74 (1.53, 1.98)***	1.24 (1.10, 1.40)***
4	Personality traits+ SOC	1.25 (1.07, 1.46)**	1.61 (1.41, 1.83)***	1.22 (1.08, 1.38)**

[a]For control variables, see note on Table II.

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Table 4. Interaction effects of personality traits and SOC[a]

	Main effect OR (95% CI)	Interaction effect OR (95% CI)
Neighborhood dissatisfaction		
	1.47 (1.12, 1.93)[**]	
Interacted with[b]		
Personality		
Extroversion		0.86 (0.59, 1.27)
Agreeableness		0.90 (0.60, 1.34)
Conscientiousness		0.91 (0.60, 1.38)
Neuroticism		0.78 (0.57, 1.07)
Openness		0.98 (0.69, 1.41)
SOC		1.49 (0.87, 2.54)
Dissatisfaction with neighborhood safety		
	1.78 (1.41, 2.24)[***]	
Interacted with[b]		
Personality		
Extroversion		1.00 (0.73, 1.36)
Agreeableness		1.08 (0.79, 1.49)
Conscientiousness		0.93 (0.66, 1.30)
Neuroticism		0.76 (0.58, 1.00)[*]
Openness		1.24 (0.91, 1.70)
SOC		0.77 (0.51, 1.14)
Dissatisfaction with trust in neighbors		
	1.32 (1.07, 1.62)[**]	
Interacted with[b]		
Personality		
Extroversion		0.88 (0.66, 1.19)
Agreeableness		1.21 (0.89, 1.63)
Conscientiousness		0.79 (0.58, 1.08)
Neuroticism		0.94 (0.73, 1.21)
Openness		0.92 (0.69, 1.23)
SOC		1.07 (0.73, 1.58)

[a]Personality, SOC, eighteen types of regional characteristics, and six types of individual features

(sex, age, marital status, educational attainment, household income, and occupational status) were also controlled for.

[b]Interaction terms with 4th (highest) quartiles of each variable were added.

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$