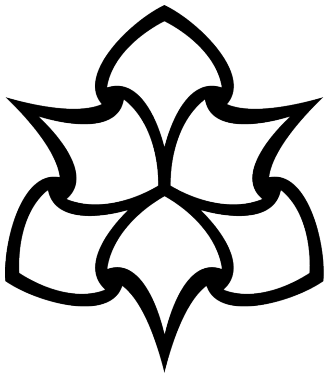

Rate of Physical Activity and Community Health:

Evidence from US Counties

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ABSTRACT

Background: Although previous studies supported the health benefits of physical activity, these studies were limited to individual-level research designs. Building upon a social-ecological model, we examined the relationship between physical activity and community health—the health status of a defined group of people—while accounting for the potential endogeneity of physical activity to health.

Methods: We obtained US county-level data from the 2012 Behavioral Risk Factor Surveillance System survey and the 2014 County Health Ranking Database. We first conducted an ordinary least squares (OLS) regression analysis to examine the relationship between the rate of physical activity and community health measured by the average perceived health score for each county. We then conducted a two-stage least squares (2SLS) regression analysis to investigate this relationship after accounting for potential endogeneity.

Results: Results from the OLS analysis indicated that the rate of physical activity was positively associated with community health. Results from the 2SLS analysis confirmed that the physical activity rate remained positively associated with community health.

Conclusions: In line with the social-ecological model, our findings provide the first evidence for the health benefits of county-level physical activity. Our results support extant research that has shown relationships between physical activity and individual-level, health-related outcomes.

The benefits of physical activity to health have been supported in the clinical and public health literature.[1–7] Physical activity lowers the risk of cardiovascular disease, type 2 diabetes, hypertension, and breast and colon cancers and improves mental health and life expectancy.[2,4,8,9] And, in general, 15 minutes per day of moderate-intensity physical activity is an effective way to prevent disease.[10] With the growing public awareness of the benefits of physical activity to health, assessing the role of physical activity in health promotion has become an important public policy goal in many countries.[11] To date, research findings on this relationship have had limited generalizability because they focused on specific geographic locations or population cohorts.[2] Recent studies have attempted to address generalizability issues by analyzing the impact of physical activity participation on health-related outcomes using large databases in Canada,[2,3,12] the Czech Republic,[13] Germany,[14] and the United States;[5,7,15] however, these studies are also limited by their individual-level research designs. Given that physical activity's effects on health can be influenced by environmental factors in communities (e.g., economic, sociocultural factors),[2] it is imperative that any analyses of the relationship between physical activity and health consider environmental differences among communities through a macro-level analysis. A better understanding of the macro-level benefits of physical activity for community health (i.e., the health status of a defined group of people)[16] will help public health officials further their efforts to support, administer, and develop effective programs that promote health in the community.[17,18]

One empirical challenge when examining physical activity and health is to provide causal evidence on this relationship.[14] For instance, individuals who choose to participate in physical activity might have a genetic background that predisposes them to better health. This raises endogeneity issues because people might be healthier regardless of their physical activity

participation.[14] Likewise, people might be healthier if they live in a community that provides more environmental resources to promote health (e.g., better neighborhood environment); that is, people might receive health benefits from the environment in which they live regardless of their physical activity participation.[19,20] Therefore, the purpose of this study was to determine the extent to which physical activity contributes to community health while accounting for potential endogeneity between physical activity and community health.

This study uses a social-ecological model as its theoretical foundation. The social-ecological model is concerned with people's interactions with their sociocultural and physical environments.[21,22] A key assumption of this model is that health and well-being are influenced uniquely by and through interactions between individual-level factors and environmental factors.[21–23] Among individual-level factors, socioeconomic status (e.g., income, education),[25–28] demographics (e.g., age, gender),[27–31] health-related behaviors (e.g., smoking behaviors, alcohol consumption),[12,26,29–32] and attitudinal orientation toward health and well-being[21,22,25,30] have been examined as correlates of health. For environmental factors, the home and neighborhood environment (e.g., place of residence, housing quality, food environment),[26,31,33–36] the work environment (e.g., programs that support employees' health, access to the workplace),[37,38] the sociocultural environment (e.g., family support, social capital, club and membership association),[28,39] and the natural environment (e.g., weather, air quality)[27,40] have been found to be correlates of health-related outcomes. Most previous social-ecological models have focused on the roles of individual and environmental factors in health-related behaviors, such as physical activity promotion,[23,24,28] but a few studies have used a social-ecological model to explain how individual and environmental factors contribute to community health.[21,22,41]

The increased popularity of the social-ecological model stems from a growing recognition that most public health challenges (e.g., encouraging people to engage regularly in physical activity) are too complex to be fully understood from single-level analyses.[21] The complexity of public health issues requires that studies take more comprehensive approaches to examine these issues, such as integrating psychological, organizational, cultural, policy, and community-planning perspectives.[21] The social-ecological model constitutes an effective framework for understanding the benefits of physical activity to community health by considering individual-level factors and environmental factors in a community.[21,22,41]

Based on the social-ecological model, we expected that the community average of individual-level factors and environmental factors would contribute to community health. In the literature, community health has been assessed by community-level health indicators, such as the adult obesity rate, the adult smoking rate, the premature death rate, and the average self-reported health status in the community.[42] In the present study, we estimated the association between the rate of physical activity in a community and an indicator of community health (the community's average perceived health score) after considering aggregated socioeconomic status, demographics, and other health-related behaviors, as well as community-level factors related to the neighborhood, sociocultural, work, and natural environments. Our study sought to extend and add knowledge to the public health literature on the relationship between physical activity and individual-level, health-related outcomes[1–7] by investigating this relationship on a macro level, while accounting for potential endogeneity inherent in this relationship.

METHODS

Study Design and Data

We used secondary data to assess the relationship between the rate of physical activity and community health among US counties. Counties were chosen as the unit of analysis because the majority of US local health departments that play a primary role in providing public health services in communities are county based.[43] To reduce common method bias, which arises when a common source is used to gather data about both the dependent and independent variables,[44] county-level data were obtained from two secondary sources: the 2012 Behavioral Risk Factor Surveillance System (BRFSS) survey[45] and the 2014 County Health Ranking (CHR) Database.[46] Data from the BRFSS survey consists of annual telephone-survey responses from adults aged 18 years or older; the survey is conducted by the health departments of all 50 states and the District of Columbia. The CHR Database ranks health-related outcomes using county-level measures from multiple national data sources, including the National Center for Chronic Disease Prevention and Health Promotion, the American Community Survey, and the National Center for Health Statistics. We combined information on the county-level variables using a 5-digit Federal Information Processing Standard code. The combined data set from the two sources included 2,235 usable counties, which represent 71% of the 3,143 counties and county equivalents in the US.

Dependent and Independent Variables

Community health, our dependent variable, was obtained from the 2012 BRFSS survey. In the survey, respondents were asked to indicate their perceived health on a 5-point scale by answering the question "Would you say that in general your health is (1) *excellent*, (2) *very good*, (3) *good*, (4) *fair*, or (5) *poor*?" Scores were reverse coded such that higher scores indicated a healthier community. This item has been widely used to assess people's general perception

toward health[7,27,29,36] and has been found to predict mortality rates.[47] The current study evaluated community health by calculating the average perceived health score for each county.

The rate of physical activity in each county (our independent variable) was extracted from the 2014 CHR Database. This variable represents the percentage of adults aged 20 and over who had participated in leisure-time physical activity or exercise during the 30 days prior to the survey; physical activity that was done as part of a person's regular job was not counted. This variable was originally obtained from the 2010 data collected by the National Center for Chronic Disease Prevention and Health Promotion to gauge the percentage of physically inactive adults for each county. For the main analysis, we reverse coded the original data to capture the rate of residents' physical activity in each county and, thus, facilitate the interpretation of the results.

Selection of Control Variables

Based on the social-ecological model, we included county-level individual and environmental factors that can influence community health as control variables in our analysis. We initially identified 34 variables related to individual and environmental factors that have been shown to affect health in previous research[23-26,31-33] from the BRFSS survey and the CHR database (see Table 1). To select the appropriate set of control variables, we conducted a model specification procedure using Mallows's C(p) (Stata version 11). For this procedure, we sought to retain the model explaining the largest variance and in which the computed C(p) value is equal or close to the total number of predictor variables based on Mallows's C(p) criterion.[48,49] We confirmed the model selection results by checking our models against the Akaike information criterion and Bayesian information criterion. Results from Mallows's C(p) indicated that 16 control variables, along with the independent variable (rate of physical activity), should be retained because the selected model presented the best congruency between the total number of

included predictors and the computed C(p) value. In addition, we retained six statistically insignificant variables (gender, marital status, ethnicity, food environment, inadequate social support, air pollution, and drinking water violation) because prior research has shown that they are important individual and environmental factors that can influence health-related outcomes.[23] Collectively, 22 control variables were included in the subsequent analyses. Table 2 presents the descriptive statistics for the 22 variables as well as the independent and dependent variables.

[Table 1 about here]

[Table 2 about here]

RESULTS

Results of Ordinary Least Squares Regression Analysis

We first conducted an ordinary least squares (OLS) regression analysis to examine the link between the rate of physical activity and community health. The left columns of Table 3 display results for the OLS regression analysis. The results indicated that the proposed model was significant ($P < .001$) and explained 64.3% of the variance in community health. Consistent with our prediction, the rate of physical activity was positively associated with community health (B = 0.205, $P < .001$). Among the control variables, income (B = 0.269, $P < .001$), children in poverty (B = 0.159, $P < .001$), education (B = 0.122, $P < .001$), severe housing problems (B = 0.077, $P< 0.001$), and population in rural area (B = 0.066, $P = .003$) were positively associated with community health, whereas healthcare inaccessibility (B = -0.134, $P < .001$), age (B = -0.094, $P < .001$), BMI (B = -0.138, $P < .001$), long commute (B = -0.053, $P = .003$), and driving alone to work (B = -0.044, $P = .004$) were negatively associated with community health.

[Table 3 about here]

Results of Robustness Analysis to Address Endogeneity

The key objective of this study was to investigate the relationship between the rate of physical activity and community health while accounting for the potential endogeneity of physical activity on health. Although the results from the OLS regression indicated a positive relationship between the rate of physical activity and community health at the county level, an alternative explanation for this relationship is that individuals who choose to participate in physical activity might live in healthier counties that support active lifestyles. The current research addressed these endogeneity issues in two ways. First, the information on the county-level physical activity rate was obtained from the year 2010, which preceded the community health measure that was extracted from the 2012 BRFSS survey. Consequently, reverse causality is unlikely, as community health in 2012 is unable to influence the physical activity rate in a county in 2010. This approach was taken into account in the OLS analysis reported above.

Second, we used an instrumental variable approach to account for potential endogeneity between the rate of physical activity and community health at the county level. A valid instrument variable should satisfy two conditions: (a) the instrumental variable directly influences the county-level physical activity rate (i.e., the relevance assumption); and (b) the instrumental variable does not affect the unobserved level of community health directly (i.e., the endogeneity assumption).[14] Following prior research,[13,14] we used access to exercise opportunity as an instrumental variable to measure the percentage of the population with adequate access to locations for physical activity in each county. Individuals who reside in a census block within one-half mile of a park, 1 mile of a recreational facility in urban areas, or 3 miles of a recreational facility in rural areas were considered to have adequate access to physical activity opportunity.[50]

The results from the two-stage least squares (2SLS) regression (see the right columns of Table 3) confirmed that the rate of physical activity remained positively correlated with community health (B = 0.066, *P* = .02) even when considering all control variables used in the OLS regression model. The results from the Durbin-Wu-Hausman test indicated that the assumption that access to physical activity opportunity was exogenous to community health was confirmed (*P* = 0.739). Along with the time-lagged effects between the rate of physical activity and community health, the results of the 2SLS analysis suggest that the endogeneity between the physical activity rate and community health was unlikely to be a major concern in this study.

DISCUSSION

Our findings showed that the higher the percentage of people engaging in physical activity in a county, the higher people's general perception toward health. These results present the first evidence of the benefits of physical activity to community health. Despite macro-level public health policy targets, previous studies have focused on individual-level research designs. Given that the effect of physical activity on health can be influenced by environmental factors in communities,[15] it is critical to assess the relationship between physical activity and health by considering environmental differences among communities through a macro-level analysis. Based on an social-ecological model, we tested and confirmed a positive association between physical activity and health at the county level, which is consistent with extant findings from individual-level analyses.[1–7] An empirical challenge in examining this relationship has been to address the potential endogeneity of physical activity to health because physical activity participation could be affected by health itself.[14] In this study, we alleviated this potential issue by using an instrumental variable approach. Although the standardized coefficients of the rate of physical activity in 2SLS appear to be small (B = 0.066), these values were comparable to or

even larger than the coefficients of other behavioral determinants, such as the percentage of smoking adults in a county. In contrast, environmental factors, such as severe housing problems, were significant predictors of community health, supporting that investigating the benefits of physical activity on health through a macro-level analysis is critical.[2] Our findings extend and enrich the extant individual-level research by supporting the idea that engaging in physical activity plays a significant role in promoting healthier communities.

Although the physical activity rate remained significant in the 2SLS analysis, it should be noted that the direct main effect was reduced after addressing the potential endogeneity issue between physical activity and health. Results from the OLS analysis indicated that the rate of physical activity had the second largest effect (B = 0.205) among the included variables, followed by the average income in a county (B = 0.269). These results are similar to findings from a prior study that investigated the relative effects of socioeconomic status and the level of physical activity on perceived health.[28] However, the results from the 2SLS analysis suggest that the rate of physical activity (B = 0.066) had a much smaller effect on community health than did the average income level (B = 0.313); furthermore, the rate of physical activity had an even smaller effect than other individual (e.g., BMI) or environmental (e.g., severe housing problems) factors. These results suggest that individual and environmental correlates of health should be put into perspective when presenting evidence of the physical activity rate on community health.

The findings from the county-level analysis will provide policy implications for public health officials to promote active lifestyles in their communities. Although physical-activity interventions can help people initiate an exercise program, many have failed to show that the routine is maintained.[51] Based on the findings from this study, local health departments can make

a case for increased prioritization of and investment in physical-activity intervention programs by highlighting the health benefits of physical activity in community health.[52]

Our results indicate that increasing the percentage of active people in the community is likely to promote community-level health status, which, in turn, might lower government health expenditures in those communities.[18] As such, community-based interventions should be considered a critical piece of the overall health-promotion efforts of local health departments.[53] Mass-participation sport events, such as walking and running, offer a community-based opportunity for physical activity that can help improve health for a large number of community residents, particularly for the least active individuals in the community.[54,55] Knowing this, public health officials might work with parks and recreational departments or local fitness clubs to develop and promote community-based exercise programs, such as walking and low-intensity jogging programs, as part of their community's physical activity initiatives.

Although this study focused on the relationship between the rate of physical activity and community health, it is worth exploring how our results for the relationships between control variables and community health are similar to or different from extant findings based on individual-level analyses. Among the individual-level factors, the results from our OLS and 2SLS analyses indicated that the average income level in a county was positively associated with community health, whereas the percentage of individuals who could not see a doctor due to cost (i.e., healthcare inaccessibility) and the percentage of children in poverty were both negatively associated with community health. These results are consistent with several studies that found significant associations between socioeconomic status and health.[24–26] Additionally, the average BMI in each county was negatively associated with community health in our study, a finding that

is also supported by extant studies using individual-level analyses.[31,33] In contrast to prior research,[31,33] the smoking population in each county was not associated with community health.

Among the environmental factors, results from the OLS and 2SLS analyses suggested that the percentage of households with housing problems in the county was positively associated with community health, implying that counties that have a higher percentage of housing problems have better community health. This finding contradicts a previous study that indicates a negative association between housing quality and perceived health.[32] Given that the level of analysis in the current study (i.e., county level) is different from the level of analysis in prior research (i.e., individual level), the positive association between severe housing problems and community health in our study cannot be compared directly with previous findings.[56] Nevertheless, our results suggest that the potential contribution of housing quality to perceived health depends on how satisfied individuals are with their housing quality.[32] That is, severe housing problems might not be an issue for people's perceived health if they live in a neighborhood where everybody has similar housing problems (e.g., overcrowding, high housing costs). Our results imply that housing problems might be unassociated with perceived health if people accept their current housing conditions. Future research should continue to explore the relationships between housing quality and health at both the individual and macro levels.

Limitations

This study has several limitations. First, although we addressed the potential endogeneity issues in two ways (i.e., obtaining physical activity data that occurred before the community health data and using an instrumental variable approach to minimize potential endogeneity between the physical activity rate and community health), the use of cross-sectional data prevented us from assessing how a transition from a highly inactivity to a highly active

community (or vice versa) would affect community health. Second, we used the percentage of adults who participated in leisure-time physical activity or exercise in the 30 days preceding the survey to measure the rate of physical activity in each county. However, this assessment might not meet public health officials' recommended minimum of 30 minutes of moderate-intensity physical activity 5 days per week.[8] Also, given that the relationship between physical activity and health-related outcomes is complicated because of the differences in type and structure of physical activity (e.g., competitive vs. noncompetitive) and variance in participation (e.g., duration, frequency of activities),[57] the county-level physical activity rate can be assessed by different indicators, such as the duration, frequency, and type of physical activity.[2,53] Third, we used the average perceived health score for each county as a measure of community health; however, community health can be assessed by other community-level health indicators, such as the adult obesity rate, the adult smoking rate, and the premature death rate.[42] The relationship between the rate of physical activity and community health could be investigated with other measures of community health to strengthen confidence in the findings. Fourth, although we examined the relationship between the county-level physical activity rate and health across the United States, the relationship might be influenced by nested geographical structures, such as states and regions. Future research is encouraged to explore the benefits of county-level physical activity in health promotion using a multilevel analysis. Finally, given that our unit of analysis is the county, our findings might not directly apply to all individuals and communities. To better understand the macro-level benefits of physical activity, it is also worth exploring the relationship between physical activity and community health with a different unit of analysis, such as state or country.

Conclusions

Although previous empirical studies consistently supported the health benefits of physical activity, these studies were limited to individual-level research designs. This study represents the first attempt to examine the role of physical activity in community health at the county level. The findings suggest that communities tend to be healthier when more residents are physically active, which is consistent with the main tenet of the social-ecological model. Our findings provide additional support for the idea that promoting physical activity is a critical component of public health policy that aims to create healthier communities.

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Table 1 Variable Descriptions

Categories	Variables	Description	C(p) Results[a]	Year	Data Source
Dependent variable	Community health	Average perceived health score		2012	BRFSS
Independent variable	Rate of physical activity	Percentage of adults aged 20 and over reporting leisure-time physical activity	√	2010	CHR
Instrumental variable	Access to exercise opportunities	Percentage of the population with adequate access to locations for physical activity	√	2010/2012	CHR
Socioeconomic status/demographic factors	Income	Average income level (from 1: below $10,000 to 8: Over $75,000)	√	2012	BRFSS
	Healthcare inaccessibility	Percentage of the population with no doctor due to cost	√	2012	BRFSS
	Children eligible for free lunch	Percentage of children eligible for free lunch		2011	CHR
	Children in poverty	Average number of children under age 18 in poverty	√	2011	CHR
	Uninsured	Percentage of population under age 65 without health insurance	√	2011	CHR
	Age	Average age	√	2012	BRFSS
	Employment status	Percentage of full-time employment	√	2012	BRFSS
	Gender	Percentage of female		2012	BRFSS
	Education	Percentage of adults with some post-secondary education	√	2012	BRFSS
	Ethnicity	Percentage of white population		2012	BRFSS
	Marital status	Percentage of married individuals		2012	BRFSS
	Children	Average number of children under 18 years old in a county	√	2012	BRFSS
	Home ownership	Percentage of home ownership		2012	BRFSS
Individual health-related factors	Body mass index (BMI)	Average BMI	√	2012	BRFSS
	Overweight	Percentage of overweight and obese population that BMI > = 25		2012	BRFSS
	Smoking	Percentage of admitting smoking	√	2006–2012	CHR
	Excessive drinking	Percentage of excessive drinking		2006–2012	CHR
	Activity limitations	During the past 30 days, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work, or recreation?		2012	BRFSS

Abbreviations: CHR, 2014 County Health Ranking; BRFSS, 2012 Behavioral Risk Factor Surveillance System.

[a] √ represents important variables based on C(p) selection results.

Table 1 Variable Descriptions (cont'd)

Categories	Variables	Description	C(p) Results[a]	Year	Data Source
Factors related to neighborhood/home environment	Violent crime	Violent crime rate per 100,000 population		2008–2010	CHR
	Severe housing problems	Percentage of households with at least 1 of 4 housing problems: overcrowding, high housing costs, or lack of kitchen or plumbing facilities	√	2006–2010	CHR
	Food environment Index	Index of factors that contribute to a healthy food environment		2010/2011	CHR
	Food insecurity	Percentage of food insecurity		2012	CHR
	Limited access to healthy foods	Percentage of limited access to healthy foods		2011	CHR
	Population living in rural area	Percentage of population living in a rural area	√	2010	CHR
	Primary care physician	Ratio of population to primary care physicians	√	2011	CHR
	Mental health providers	Ratio of population to mental health providers		2013	CHR
	Dentist	Ratio of population to dentists		2012	CHR
	Injury deaths	Average number of injury deaths		2006–2010	CHR
Factors related to sociocultural environment	Inadequate social support	Percentage of adults without social/emotional support		2005–2010	CHR
Factors related to work environment	Long commute	Among workers who commute in their car alone, the percentage that commute more than 30 minutes	√	2008–2012	CHR
	Driving alone to work	Percentage of the workforce that drives alone to work	√	2008–2012	CHR
Factors related to natural environment	Air pollution	Average daily measure of fine particulate matter in micrograms per cubic meter (PM2.5) in a county		2008	CHR
	Drinking water violation	Percentage of population potentially exposed to water exceeding a violation limit during the past year		2012	CHR

Abbreviations: CHR, 2014 County Health Ranking; BRFSS, 2012 Behavioral Risk Factor Surveillance System.

[a] √ represents important variables based on C(p) selection results.

Table 2 Descriptive Statistics for Studied Variables (n = 2235)[a]

Variables	Mean	SD	Minimum	Maximum
Community health	3.308	0.283	1.600	4.500
Rate of physical activity	0.715	0.098	0	1
Access to exercise opportunities	0.566	0.224	0	1
Income	5.330	0.668	1	7.550
Healthcare inaccessibility	0.137	0.069	0	0.596
Children in poverty	0.243	0.087	0.040	0.600
Uninsured	0.173	0.052	0.030	0.390
Age	56.528	3.717	29.500	74.000
Employment status	0.503	0.106	0	1
Gender	0.608	0.081	0	1
Education	0.546	0.131	0	1
Ethnicity	0.835	0.156	0	1
Marital status	0.566	0.099	0	1
Children	1.900	0.403	0	6.000
Body mass index (BMI)	28.121	1.304	21.550	43.060
Smoking	0.200	0.075	0	0.510
Severe housing problems	0.147	0.041	0.060	0.370
Food environment index	7.523	1.050	1.430	10.000
Population living in rural area	0.486	0.280	0	1
Primary care physician	57.443	31.488	0	508.000
Inadequate social support	0.171	0.079	0	0.390
Long commute	0.307	0.115	0.030	0.710
Driving alone to work	0.798	0.059	0.070	0.910
Air pollution	11.731	1.624	0	14.900
Drinking water violation	0.076	0.139	0	1

[a] The descriptive statistics shown in this table presented the final sample of 2,235 counties.

Table 3 Parameter Estimates for the OLS Regression and the 2SLS Regression

	OLS Regression			2SLS Regression		
Variables	b	SE	B	b	SE	B
Rate of physical activity	0.592***	0.080	0.205	0.190*	0.092	0.066
Income	0.114***	0.014	0.269	0.132*	0.063	0.313
Healthcare inaccessibility	-0.546***	0.114	-0.134	-0.624*	0.278	-0.153
Children in poverty	-0.515***	0.112	-0.159	-0.619	0.360	-0.191
Uninsured	-0.113	0.122	-0.021	-0.155	0.184	-0.028
Age	-0.007***	0.002	-0.094	-0.009	0.006	-0.116
Employment status	0.029	0.069	0.011	-0.006	0.137	-0.002
Gender	-0.029	0.073	-0.008	-0.044	0.097	-0.013
Education	0.264***	0.060	0.122	0.425	0.529	0.197
Ethnicity	0.054	0.051	0.029	0.043	0.069	0.024
Marital status	-0.081	0.069	-0.028	-0.021	0.203	-0.007
Family structure	-0.009	0.015	-0.013	0.000	0.035	0.001
Body mass index	-0.030***	0.005	-0.138	-0.033**	0.012	-0.153
Smoking	-0.178	0.097	-0.047	-0.178	0.100	-0.047
Severe housing problems	0.530***	0.149	0.077	0.570*	0.279	0.107
Food environment index	-0.004	0.007	-0.016	-0.002	0.010	-0.009
Population living in rural area	0.066**	0.023	0.066	0.082	0.057	0.081
Primary care physician	0.000	0.000	0.003	0.000	0.000	0.013
Inadequate social support	0.007	0.067	0.002	0.012	0.072	0.003
Long commute	-0.130**	0.043	-0.053	-0.172	0.146	-0.070
Driving alone to work	-0.211**	0.072	-0.044	-0.301	0.301	-0.063
Air pollution	-0.004	0.003	-0.023	-0.005	0.005	-0.029
Drinking water violation	-0.008	0.028	-0.004	-0.023	0.057	-0.011
Intercept	3.831***	0.269	NA	4.455***	0.206	NA
R-sq		0.646			0.603	
adj. R-sq		0.643			0.599	

Abbreviations: OLS: ordinary least squares; 2SLS: two-stage least squares; SE: robust standard errors; NA: not applicable

* $P < .05$. ** $P < .01$. *** $P < .001$.