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Perceived Neighborhood Safety Better Predicts Risk of Mortality for Whites than Blacks

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Abstract

Aim—The current study had two aims: (1) to investigate whether single-item measures of subjective evaluation of neighborhood (i.e., perceived neighborhood safety and quality) predict long-term risk of mortality and (2) to test whether these associations depend on race and gender.

Methods—The data came from the Americans' Changing Lives Study (ACL), 1986–2011, a nationally representative longitudinal cohort of 3361 Black and White adults in the USA. The main predictors of interest were perceived neighborhood safety and perceived neighborhood quality, as measured in 1986 using single items and treated as dichotomous variables. Mortality due to all internal and external causes was the main outcome. Confounders included baseline age, socioeconomic status (education, income), health behaviors (smoking, drinking, and exercise), and health (chronic medical conditions, self-rated health, and depressive symptoms). Race and gender were focal effect modifiers. Cox proportional hazard models were ran in the pooled sample and stratified by race and gender.

Results—In the pooled sample, low perceived neighborhood safety and quality predicted increased risk of mortality due to all causes as well as internal causes, net of all covariates. Significant interaction was found between race and perceived neighborhood safety on all-cause mortality, indicating a stronger association for Whites compared to Blacks. Race did not interact with perceived neighborhood quality on mortality. Gender also did not interact with perceived neighborhood safety or quality on mortality. Perceived neighborhood safety and quality were not associated with mortality due to external causes.

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Author's Contributions

Shervin Assari designed and analyzed this work, as well as drafted and revised the paper. He also confirmed the final version.

Conflict of Interest

The author declares that he has no conflicts of interest.

Animal Studies

No animal studies were carried out by the authors for this article.

Ethics

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all participants included in the study. University of Michigan Institutional review board (IRB) approved the study protocol.

Conclusion—Findings suggest that single items are appropriate for the measurement of perceived neighborhood safety and quality. Our results also suggest that perceived neighborhood safety better predicts increased risk of mortality over the course of 25 years among Whites than Blacks.

Keywords

neighborhood; safety; mortality; life course; race; ethnic groups

Introduction

According to the lifecourse epidemiology approach, health outcomes are under the influence of exposures that occur several decades earlier in life [1]. According to this view, late health outcomes such as mortality are shaped by processes experienced decades earlier in life [2]. To test such hypotheses, long-term epidemiological studies are needed; their results may suggest previously unrecognized opportunities for increasing life expectancy through interventions earlier in life [3].

Using a lifecourse epidemiology perspective [4, 5, 6] and building upon a literature which suggests subjective evaluation of neighborhood quality and safety have long-term health consequences several decades later in life [7, 8], the current study investigates whether or not perceived neighborhood safety and quality during mid adulthood (average age = 42) predict subsequent risk of mortality. To generate results that are representative to the US population, we used data from the Americans' Changing Lives (ACL) study, a 25-year longitudinal cohort with a nationally representative sample of US adults [9, 10]. Data from the ACL study has previously shown that baseline psychosocial risk factors better predict risk of mortality for Whites than Blacks [11, 12, 13, 14, 15, 16], a finding which has been replicated across populations and outcomes [17, 18, 19, 20, 21, 22]. It is, however, unknown whether or not race also alters the effects of neighborhood quality and safety on mortality or not.

Previous research has shown that subjective evaluation of the social environment (e.g., perceived neighborhood safety and quality) has major implications for a wide range of physical and mental health outcomes, net of demographics, socioeconomics, lifestyle factors, and baseline health [23]. Individuals who state that the social aspects of their neighborhood need improvement are also more likely to report poor health [23]. Not only objective measures of neighborhood quality [24, 25], but also subjective perceptions about neighborhood safety and quality have major implications for health outcomes [26, 27, 28].

Most research on the link between place and health has focused on physical rather than social aspects of the environment. In addition, most of this research has used a cross-sectional design, and when it comes to physical health outcomes, very few studies have focused on the risk of mortality over a long period of time. Thus, there is a need to study the role of perceptions about neighborhood safety and quality on risk of mortality in nationally representative cohorts over extended time periods.

The effect of a deprived neighborhood on health may not, however, be equal for all social groups [29]. It has been shown that race [30] and gender [7, 8, 31] alter salience of neighborhood on health outcomes. For instance, Stafford, Marmot, and others found that trust, integration into wider society, and physical quality of the residential environment have systematically larger effects on women than men, suggesting that women may be more vulnerable to the influence of the environment on health outcomes [32].

The current longitudinal study investigates (1) whether single items that measure perceiving one's neighborhood as unsafe and low quality predict subsequent risk of all-cause mortality over a 25-year period in a nationally representative sample, and (2) whether race and gender alter these associations.

Methods

Design and Setting

Data came from the Americans' Changing Lives (ACL) Study, conducted from 1986 to 2011. The ACL study is a nationally representative study of US adults 25 years and older. More information on the sampling and data collection has been published elsewhere [9, 10].

Ethics

The University of Michigan Institutional Review Board (IRB) approved the study protocol. Informed consent was received from all participants. All procedures were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) with the Helsinki Declaration of 1975.

Sampling and Participants

The ACL study used a stratified multistage probability sample of non-institutionalized US adults and oversampled older adults (age > 60) and Blacks. The study enrolled 3617 adults who were 25 years or older and were living in the continental USA in 1986 (representing 70 % of sampled households and 68 % of sample individuals at baseline).

Analytical Sample

In the current study, analysis is limited to non-Hispanic Whites and non-Hispanic Blacks. The analytic N is 3361, which is composed of 2205 Whites and 1156 Blacks.

Process

Data at baseline were collected via face to face interviews in 1986. Mortality data were collected from death certificates, informants, and the National Death Index (NDI), which were used to assess date of death (discussed below).

Measures

Perceived Neighborhood Safety and Quality—Baseline perceived neighborhood safety and quality were measured in 1986 as single items. In line with the literature [33, 34], we treated these variables as dichotomous variables. The item for perceived neighborhood safety was "*How true is the following statement about your neighborhood: This is a*

neighborhood where I feel safe from personal attacks. Is this very true, mostly true, somewhat true, or not true at all?" Items included (1) very true, (2) mostly true, (3) somewhat true, or (4) not true at all. We created a dichotomous variable, unsafe (not true at all) versus all other responses (very true, mostly true, or somewhat true). The item for perceived neighborhood quality reads: "*How satisfied are you with your neighborhood? Are you completely satisfied, very satisfied, somewhat satisfied, not very satisfied, or not at all satisfied?*" Item responses included (1) completely satisfied, (2) very satisfied, (3) somewhat satisfied, (4) not very satisfied, or (5) not at all satisfied. We created a dichotomous variable, not satisfied (not very satisfied, not at all satisfied) versus satisfied (completely satisfied, very satisfied, or somewhat satisfied). Single-item measures have been commonly used for the measurement of subjective evaluation of neighborhood characteristics [8, 35, 36]. Thus, hazard ratios >1 associated with our independent variables were indicative of associations between poor subjective evaluation of neighborhood quality and safety and increased risk of mortality.

Mortality—Mortality data for all deaths from mid-1986 through 2011 were obtained through the National Death Index (NDI), death certificates, as well as informants. In most cases, time and cause of death were verified with death certificates. Mortality data was evaluated for all participants regardless of their follow-up status. This means that mortality was monitored for all respondents who were in the baseline sample, even if they failed to respond to a follow-up interview. With a handful of exceptions, the death status of all the participants was determined. These handfuls of cases where death could not be verified with death certificates were reviewed carefully, and actual death was certain in all cases. Only in these few cases was the date of death ascertained from the informants or the NDI report, rather than the death certificate [12, 13].

Internal and External Causes of Death—Based on specific causes of death, we also determined internal and external causes of death. Internal causes of death were defined as death due to natural causes, as primarily attributed to an illness or an internal malfunction of a body organ not directly influenced by external forces. Internal causes of death included death due to cardiovascular conditions, blood, metabolic disorders such as diabetes, kidney disease, liver disease, respiratory conditions, gastroenterological disease, infectious causes, and cancer [37]. External causes of death (unnatural death) relate to cases where the underlying cause of death is determined to be one of a group of causes external to the body (for example, suicide, transport accidents, falls, poisoning, etc.). External causes of death included intentional and unintentional injuries. Main examples of external causes of death included death secondary to suicides, homicides, accidents, and other external causes [38].

Demographic Factors—Demographic characteristics in this study included age (a continuous variable) and gender (male versus female).

Socioeconomic Factors—Socioeconomic factors in this study included educational attainment (years of schooling) and income of the respondent (and spouse if present), both operationalized as continuous variables, and both collected in 1986. Education was measured in 11 categories.

Exercise—A physical activity index was derived from answers to survey questions regarding engagement in exercise, active sports, gardening/yard work, household chores, and walking. Higher scores on this index were indicative of more exercise frequency [39, 40].

Smoking—Information was collected on self-reported history of smoking. We used a dichotomous variable (current smoker = 1, never or ex-smoker = 0).

Drinking—A measure was used concerning alcohol use, that is, whether or not the respondent currently drinks (1 = current drinker and 0 = non-drinker) [41].

Obesity—Obesity was defined based on the body mass index (BMI) of larger than 30 kg/m^2. The BMI level was calculated based on self-reported weights and heights. Weight and height were originally collected in pounds (1 lb = 0.453 kg) and feet (1 ft = 0.3048 m)/ inches (1 in. = 0.0254 m), respectively. BMI calculated based on self-reported weight and height is known to be closely correlated with BMI based on direct measures of height and weight [42].

Number of Chronic Medical Conditions—Baseline Chronic Medical Conditions (CMC) were measured using self-reports on whether a health care provider has ever told the respondents that they had each of seven focal chronic medical conditions (hypertension, diabetes, chronic lung disease, heart disease, stroke, cancer, and arthritis). Responses were summed, resulting in a score ranging from 0 to 7 [10].

Self-Rated Health (SRH)—Respondents were asked to classify their self-rated health as excellent, very good, good, fair, or poor. The literature has treated SRH as dichotomous variable, a continuous measure, or an ordinal variable [43, 44, 45, 46]. We collapsed to two categories (fair/poor vs. excellent/very good/good), a cut-off point that is common in the literature [18].

Depressive Symptoms—The severity of depressive symptoms was measured with an 11-item version of the Center for Epidemiological Studies Depression scale (CES-D) [47]. CES-D items measure the extent to which respondents felt depressed, happy, lonely, sad, that everything was an effort, that their sleep was restless, that people were unfriendly, that they did not feel like eating, that people dislike them, that they could not get going, and that they enjoyed life. Positively worded items were reverse-coded. This abbreviated CES-D scale has shown acceptable reliability and a similar factor structure compared to the original version [48, 49, 50]. Possible item responses ranged from never or hardly ever (score 1) to most of the time (score 3), resulting in a continuous measure of depressive symptoms with a potential range from 11 to 33. Higher scores indicated a greater severity of depressive symptoms.

Moderators—In this study, race and gender were the focal moderators. Gender was a dichotomous variable (with male respondents as the referent category). Self-identified race was defined as Black versus White (with White respondents as the referent category). The ACL study collected data on participant's race at baseline in 1986 with multiple survey items. Participants were asked about Hispanic origin and gave an open-ended response to the

question, “In addition to being American, what do you think of as your ethnic background or origins?” Participants were then asked: “Are you White, Black, American Indian, Asian, or another race?” and were allowed to answer with multiple categories. Individuals who responded with more than one non-white group were asked to identify which “best described” their race. The ACL study also assessed the state or foreign country of birth. Together, these items were used to construct race categories of “Non-Hispanic White,” “Non-Hispanic Black,” “Non-Hispanic Native American,” “Non-Hispanic Asian,” and “Hispanic.” As our second aim was to compare Black and Whites for the effect of our predictor of interest on mortality, we decided not to include Hispanics in this study. Thus, our sample is composed of Non-Hispanic Whites and Non-Hispanic Blacks [11, 12, 13, 17, 18].

Statistical Analysis

As the ACL study utilized a complex sample design, Stata version 13.0 (*Stata* Corp., College Station, TX, USA) was used for data analysis. Using Taylor series linearization, standard errors were re-estimated based on the survey design, using sampling and non-response weights (wave 1 weights). Several proportional hazard models were estimated in the pooled sample, specific to race groups. First, models were ran in the pooled sample of Blacks and White to evaluate the effects of race and perceived neighborhood safety and quality on mortality outcomes, net of all covariates. Then, interaction terms were entered between race and gender with perceived neighborhood safety and quality. Finally, the model ran was stratified by race and gender. Models were replicated for mortality due to all causes. Hazard ratios, standard errors, 95 % confidence intervals (CI), and p values were reported. We considered p values less than 0.05 as significant.

Proportional hazard models require two outcomes: (1) a binary outcome (event) and (2) the time that the outcome occurred (time to event). Mortality was coded as 1 if death happened due to any cause between 1986 and 2011, and 0 otherwise. Time to death was calculated in months from baseline to month of death or the end of the year 2011. For Schoenfeld residual analysis, -estat phtest- in Stata was used to evaluate the proportional hazard assumptions for the proportional hazard models.

The main predictors of interest were baseline perceived neighborhood safety and quality measured in 1986, while the main outcome was mortality (due to all causes, internal or external) over a 25-year follow-up. Covariates included baseline demographic factors (age), socioeconomic characteristics (education and income), health behaviors (smoking, drinking, and exercise), and health status (depressive symptoms, SRH, and CMC), all measured in 1986. Race and gender were the main moderators.

Results

The study followed 3361 Blacks and Whites, ages 25 and older, for 25 years. Table 1 presents detailed descriptive statistics on study variables in the pooled sample, based on race. While Whites and Blacks did not differ in age and gender, they differed in education, income, BMI, SRH, depressive symptoms, and mortality. Compared to Whites, Blacks had

significantly lower socioeconomic status (education and income), higher depressive symptoms, and poorer health (CMC, BMI, and SRH) at baseline. Blacks had worse perceived neighborhood quality and safety as well.

Overall, 1737 deceased Black or White participants were detected, while 1624 Black or White individuals survived. Table 2 presents the results of three proportional hazard models in the pooled sample, with perceived neighborhood safety at baseline as the main predictor. *Model 1* did not include any interaction term and tested the effect of perceived neighborhood safety at baseline on mortality, net of all covariates. *Model 2* tested the interaction term between baseline perceived neighborhood safety and race. *Model 3* included gender by baseline perceived neighborhood safety interaction in the model. In *Model 1*, poor perceived neighborhood safety at baseline was associated with an increased risk of all-cause mortality (HR = 1.47, 95%CI = 1.05–2.04) and also internal causes of mortality (HR = 1.49, 95%CI = 1.06–2.11), net of all covariates. *Model 2* showed an interaction between race and perceived neighborhood safety on all-cause (HR = 0.55, 95%CI = 0.31–0.98) as well as internal causes of mortality (HR = 0.53, 95%CI = 0.29–0.98), suggesting stronger effects of baseline perceived neighborhood safety on long-term risk of mortality due to all causes as well as internal causes among Whites compared to Blacks. In *Model 3*, gender did not interact with perceived neighborhood safety at baseline on mortality due to all causes or internal causes ($p > 0.05$).

Table 3 presents the results of three proportional hazard models in the pooled sample with perceived neighborhood quality at baseline as the main predictor. *Model 1* did not include any interaction term; *Model 2* tested the interaction term between perceived neighborhood quality at baseline and race. *Model 3* included gender by perceived neighborhood quality at baseline interaction in the model. In *Model 1*, baseline perceived neighborhood quality was associated with risk of all-cause mortality (HR = 1.33, 95%CI = 1.02–1.71), net of all covariates. *Model 2* did not show an interaction between race and perceived neighborhood quality ($p > 0.05$). In *Model* 3, gender did not interact with neighborhood quality at baseline on all-cause mortality ($p > 0.05$). Perceived neighborhood quality at baseline was not associated with increased risk of mortality due to internal causes ($p > 0.05$). Race and gender also did not interact with perceived neighborhood quality at baseline on risk of mortality due to internal causes ($p > 0.05$).

Table 4 presents the results of proportional hazard models specific to race groups, with perceived neighborhood safety at baseline as the main predictor of interest. Among Whites (*Model 1*), baseline perceived neighborhood safety was a predictor of all cause (HR = 1.72, 95%CI = 1.14–2.59) as well as internal causes (HR = 1.75, 95%CI = 1.16–2.63) of mortality. In Blacks (*Model 2)*, baseline perceived neighborhood safety was not a predictor of all-cause or internal causes of mortality ($p > 0.05$).

Table 5 presents the results of proportional hazard models specific to race groups, with perceived neighborhood quality at baseline as the main predictor. Among Whites (*Model 1*), baseline perceived neighborhood quality was a predictor of all-cause mortality (HR = 1.40, 95%CI = 1.02–1.92). Among Whites (*Model 1*), baseline perceived neighborhood quality was not a predictor of mortality due to internal causes ($p > 0.05$). In Blacks (*Model 2)*,

baseline perceived neighborhood quality was not a predictor of mortality due to all causes or internal causes ($p > 0.05$).

Perceived neighborhood safety and quality at baseline were not associated with increased risk of mortality due to external causes (results not shown due to non-significance of all paths).

Discussion

Building on a lifecourse epidemiological approach and using nationally representative data, the current study showed three major findings: first, single-item perceived neighborhood safety and quality at baseline predicted 25-year risk of mortality due to all causes as well as internal causes, but not external causes. Second, the predictive role of perceived neighborhood safety on all-cause and internal cause mortality was larger for Whites than Blacks. Third, gender did not alter the predictive role of subjective neighborhood evaluation on mortality risk.

Our first finding lends support to the lifecourse epidemiological literature that late health outcomes have social antecedents several decades earlier [51, 52, 53, 54]. Previous research has documented a link between perceived neighborhood characteristics and health, above and beyond socioeconomic and lifestyle factors [23]. Current findings also suggest that single-item measures are appropriate for the measurement of subjective evaluation of neighborhood characteristics, as they predict subsequent risk of mortality [6].

Our second finding is in line with larger effects of a wide range of psychosocial factors such as education [55, 56], self-rated health [18], depressive symptoms [12, 13], perceived control over life [14], and self-efficacy [15] on chronic disease and mortality for Whites than Blacks. One explanation for these systematic Black-White differences is that, in general, Blacks have lived their lives under adversities which has possibly prepared them for and enhanced their ability to cope with adversities, while Whites may have less experience dealing with adversities and have not mastered their coping skills. This view is in contrast to the multiple adversity hypothesis [57] suggesting that due to exposure to multiple risk factors, Blacks are more vulnerable than Whites to the effect of each risk factor.

In our study, subjective evaluation of neighborhood predicted mortality due to chronic disease. Perceived low neighborhood quality is shown to increase the risk of a wide range of chronic medical conditions including obesity [7], hypertension [58], diabetes [59], cardiovascular conditions [58], stroke [60], asthma [61], and cancer [62]. Low perceived neighborhood social cohesion increases risk for stroke mortality, an effect which remains significant after adjusting for a comprehensive list of potential risk factors [63]. Perception of unsafe neighborhoods also predicts subsequent deterioration of SRH among youth [8]. Perceived unsafe environment also increases the risk of mobility disability among elders at retirement age with income below the poverty line [64].

We do not know whether subjective evaluation of one’s neighborhood as unsafe directly deteriorates health or if it is a proxy of a disadvantaged environment and undesired life condition that cumulatively cause poor health. Several aspects of the social environment

(i.e., social capital and cohesion) are associated with health outcomes [65, 66]. Promotion of connectedness with family, friends, colleagues, and other members of a social network may protect the health of community residents [67]. Some of this effect may be through social support which flows between individuals, buffering the effect of stress and adversities and reducing feelings of vulnerability and loneliness, while enhancing sense of control over life. Supportive social relations also increase availability of material and emotional resources that are needed at the time of dealing with stress [68]. Social support minimizes adverse effects of stressors [69]. When the neighborhood is perceived as safe, social network members spend more time in the community which increases flow of social support in the community. In high quality neighborhoods, vibrant formal and informal community organizations connect individuals that result in new relationships, trust, and reciprocity. Social organizations in safe neighborhoods provide opportunities for volunteer work and altruism [70, 71, 72], as well as social capital and cohesion [73, 74], all of which protect health. A shortage of social organizations, resources, trust, and a sense of safety may deteriorate a wide range of health outcomes among community residents [75].

Obesity and metabolic disorders may partially explain the effects of the social environment on mortality [76, 77]. Poor neighborhood quality increases the risk of obesity [77]. Perceived neighborhood disorder is associated with increased energy and sodium intake and decreased potassium levels [76]. Perceived neighborhood disorder is also associated with poor physical activity [77]. In a study by Assari et al., fear of neighborhood violence predicted development of obesity a decade later among female but not male Black youth [7]. In another study, perceived neighborhood disorder was associated with an increased risk of obesity, an association entirely mediated by psychological distress [78].

Psychological distress is another potential mechanism through which poor neighborhood quality can impact physical health. Perceiving one’s neighborhood as unsafe increases the risk of depression and psychological distress beyond socioeconomic status [79]. Wilson et al. showed that perceptions of physical and social characteristics of one’s neighborhood were linked to self-rated health and emotional distress [23].

Perceived neighborhood safety may be one of the mechanisms by which living in areas with high rates of crime, homelessness, drug trafficking, and prostitution increase health problems of its residents [23]. Policies and programs that enhance perceived safety through reducing social disorder and prevention of violent crime may slow the deterioration of the health of residents, particularly women who live in unsafe neighborhoods. To promote well-being of individuals, more investments should be made to enhance subjective aspects of the neighborhood that they live in [79].

This study did not find gender differences in the role of perceived neighborhood safety on mortality risk. The literature, however, suggests that women may be more prone to the health effects of the physical and social aspects of their environments [7, 8, 80, 81, 82]. In 2015, Assari, Caldwell, and Zimmerman did find gender differences in longitudinal associations between an increase in perceived neighborhood fear and depressive symptoms among Black youth over a short period of time [31]. The Moving to Opportunity (MTO) Study has shown that benefits associated with change in neighborhood may be stronger for females than

males, as moving to low-poverty neighborhoods has lowered the risk behavior of females but not males [83]. Osypuk and colleagues have also shown gender differences in reduction of psychological distress and risky behaviors following moving to lower-poverty neighborhoods [55].

Our study had a few limitations. We used single items to measure perceived neighborhood quality. Thus, we cannot rule out the possibility of measurement bias. The current study exclusively focused on the social environment; however, physical aspects of neighborhoods also influence health outcomes [84]. Although subjective evaluation of one's neighborhood is dynamic and subject to change over time, we only measured them at baseline. In addition to the social environment [85, 86, 87, 88, 89, 90, 91, 92], neighborhood socioeconomic status [4, 53, 54] also affects health. We did not include neighborhood-level factors such as racial composition, density of resources, or high level socioeconomic status [65, 66]. We also did not measure access to care, which affects health. Our study was still a unique contribution to the literature by showing that subjective evaluation of one's neighborhood better predicts mortality for Whites than Blacks. Despite these limitations, using a nationally representative sample with 25 years of follow-up was a major strength. While several other outcomes have been investigated [85, 87, 91, 93, 94, 95], this study linked the social environment to mortality.

Future research may operationalize perception about one's neighborhood as time varying covariates. Future research should also use multi-item standard measures that are already available for measurement of neighborhood quality [96]. Research should also investigate the mechanisms by which subjective and objective aspects of neighborhood quality influence health outcomes [65, 66, 77, 97, 98, 99]. Additional research may also examine why race alters the effects of neighborhood characteristics on health outcomes. Finally, research should examine whether or not enhancing subjective neighborhood quality through higher level contextual interventions that promote sense of neighborhood safety would result in health promotion or not [55, 83, 100, 101, 102, 103, 104, 105].

According to our study, single items are appropriate tools to measure subjective neighborhood safety and quality, as they predict long-term risk of mortality due to all causes as well as internal causes. Neighborhood safety, however, better predict mortality risk for Whites than Blacks.

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Table 1

Baseline characteristics for the analytic sample, stratified by race and overall

	Whites		Blacks		All	
	Mean (SE)	**95%CI**	**Mean (SE)**	**95%CI**	**Mean (SE)**	**95%CI**
Age	47.96 (0.60)	46.75–49.17	46.33 (0.72)	44.89–47.78	47.77 (0.53)	46.69–48.84
Education *	12.69 (0.11)	12.48–12.90	11.37 (0.23)	10.90–11.84	12.53 (0.10)	12.34–12.73
Income *	5.57 (0.10)	5.36–5.77	4.25 (0.18)	3.88–4.62	5.41 (0.09)	5.22–5.60
Chronic medical conditions *	0.78 (0.03)	0.71–0.84	0.91 (0.05)	0.81–1.02	0.79 (0.03)	0.74–0.85
Body mass index *	25.34 (0.12)	25.11–25.58	26.94 (0.20)	26.53–27.34	25.54 (0.11)	25.32–25.75
Depressive symptoms						
	% (SE)	95%CI	% (SE)	95%CI	% (SE)	95%CI
Gender						
Male	47.82 (0.01)	45.12–50.52	43.18 (0.02)	38.79–47.69	47.26 (0.01)	44.86–49.68
Female	52.18 (0.01)	49.48–54.88	56.82 (0.02)	52.31–61.21	52.74 (0.01)	50.32–55.14
Self-rate health *						
Good-excellent	85.97 (0.01)	84.15–87.60	78.38 (0.02)	74.68–81.68	85.06 (0.01)	83.33–86.64
Poor-fair	14.03 (0.01)	12.40–15.85	21.62 (0.02)	18.32–25.32	14.94 (0.01)	13.36–16.67
Neighborhood Safety *						
High	97.34 (0.01)	96.35–98.06	88.81 (0.01)	85.52–91.43	96.32 (0.01)	95.31–97.12
Low	2.66 (0.01)	1.94–3.65	11.19 (0.01)	8.57–14.48	3.68 (0.01)	2.88–4.69
Neighborhood Quality *						
High	90.53 (0.01)	89.01–91.86	84.04 (0.01)	80.30–87.18	89.75 (0.01)	88.43–90.94
Low	9.47 (0.01)	8.14–10.99	15.96 (0.01)	12.82–19.70	10.25 (0.01)	9.06–11.57

CES-D Center for Epidemiologic Studies Depression Scale

* $p < 0.05$ for all comparisons between Blacks and Whites

Table 2

Association between neighborhood safety and all-cause mortality in the pooled sample

	Model 1				Model 2				Model 3			
	All causes		Internal causes		All causes		Internal causes		All causes		Internal causes	
	HR	95%CI	HR	95%CI	HR	95%CI	HR	95%CI	HR	95%CI	HR	95%CI
Blacks	1.03	0.89–1.19	0.96	0.82–1.12	1.09	0.92–1.28	1.02	0.86–1.21	1.03	0.89–1.19	0.95	0.82–1.11
Women	0.52***	0.45–0.61	0.51***	0.43–0.59	0.52***	0.45–0.61	0.50***	0.43–0.59	0.53***	0.45–0.61	0.51***	0.43–0.60
Age	1.09***	1.08–1.09	1.09***	1.08–1.10	1.09***	1.08–1.09	1.09***	1.08–1.10	1.09***	1.08–1.09	1.09***	1.08–1.10
Education (years)	0.99	0.97–1.01	0.99	0.96–1.02	0.99	0.97–1.01	0.99	0.97–1.02	0.99	0.97–1.01	0.99	0.96–1.02
Income	0.93***	0.90–0.97	0.93***	0.90–0.97	0.93***	0.90–0.97	0.93***	0.90–0.97	0.93***	0.90–0.96	0.93***	0.90–0.97
Smoking (current smoking)	1.76***	1.51–2.07	1.86***	1.58–2.19	1.76***	1.50–2.07	1.86***	1.58–2.19	1.76***	1.50–2.07	1.86***	1.58–2.19
Drinking (drinks per month)	1.00	1.00–1.00	1.00	1.00–1.00	1.00	1.00–1.00	1.00	1.00–1.00	1.00	1.00–1.00	1.00	1.00–1.00
Exercise	0.89***	0.84–0.94	0.89***	0.84–0.95	0.89***	0.84–0.94	0.89***	0.84–0.95	0.89***	0.84–0.94	0.89***	0.84–0.95
Obese	1.05	0.90–1.23	1.08	0.90–1.28	1.06	0.90–1.24	1.08	0.91–1.29	1.05	0.90–1.23	1.08	0.90–1.28
CMC	1.16***	1.11–1.22	1.16***	1.10–1.23	1.16***	1.10–1.22	1.16***	1.10–1.23	1.16***	1.11–1.22	1.16***	1.10–1.23
SRH	1.42***	1.21–1.66	1.46***	1.23–1.74	1.42***	1.21–1.66	1.47***	1.23–1.75	1.42***	1.21–1.66	1.46***	1.23–1.74
Depressive symptoms	1.01	0.93–1.08	1.02	0.94–1.10	1.01	0.93–1.08	1.02	0.95–1.10	1.01	0.93–1.08	1.02	0.94–1.10
Neighborhood safety (poor)	1.47*	1.05–2.04	1.49*	1.06–2.11	1.72**	1.15–2.56	1.75**	1.18–2.61	1.59#	0.93–2.70	1.70#	1.00–2.89
Neighborhood safety × race	-	-	-	-	0.55*	0.31–0.98	0.53*	0.29–0.98	-	-	-	-
Neighborhood safety × gender	-	-	-	-	-	-	-	-	0.88	0.54–1.44	0.82	0.50–1.34

CMC chronic medical conditions, *SRH* self-rated health

p < *0.1*;

* *p* < 0.05;

** *p* < 0.01;

*** *p* < *0.001*

Table 3

Association between neighborhood quality and all-cause mortality in the pooled sample

	Model 1				Model 2				Model 3			
	All causes		Internal causes		All causes		Internal causes		All causes		Internal causes	
	HR	95%CI	HR	95%CI	HR	95%CI	HR	95%CI	HR	95%CI	HR	95%CI
Blacks	1.04	0.89–1.20	0.97	0.83–1.13	1.07	0.90–1.27	1.01	0.85–1.21	1.04	0.89–1.20	0.97	0.83–1.13
Women	0.53***	0.45–0.62	0.51***	0.43–0.60	0.53***	0.46–0.62	0.51***	0.43–0.60	0.52***	0.44–0.61	0.50***	0.42–0.59
Age	1.09***	1.08–1.10	1.09***	1.08–1.10	1.09***	1.08–1.10	1.09***	1.08–1.10	1.09***	1.08–1.10	1.09***	1.08–1.10
Education (years)	0.99	0.97–1.01	0.99	0.96–1.02	0.99	0.97–1.01	0.99	0.96–1.02	0.99	0.97–1.01	0.99	0.961.02
Income	0.94***	0.91–0.97	0.94***	0.90–0.97	0.94***	0.91–0.97	0.94***	0.90–0.97	0.94***	0.91–0.97	0.94***	0.90–0.97
Smoking (current smoking)	1.78***	1.52–2.09	1.88***	1.60–2.20	1.78***	1.52–2.09	1.88***	1.602.20-	1.78***	1.52–2.08	1.87***	1.60–2.19
Drinking (drinks per month)	1.00	1.00–1.00	1.00	1.00–1.00	1.00	1.00–1.00	1.00	1.00–1.00	1.00	1.00–1.00	1.00	1.00–1.00
Exercise	0.89***	0.84–0.94	0.89***	0.84–0.95	0.89***	0.84–0.94	0.89***	0.84–0.95	0.88***	0.83–0.94	0.89***	0.84–0.95
Obese	1.06	0.91–1.24	1.08	0.91–1.29	1.06	0.91–1.24	1.08	0.91–1.29	1.06	0.91–1.24	1.08	0.91–1.29
CMC	1.16***	1.11–1.22	1.16***	1.10–1.22	1.16***	1.11–1.22	1.16***	1.10–1.22	1.16***	1.11–1.22	1.16***	1.10–1.23
SRH	1.42***	1.21–1.67	1.47***	1.23–1.75	1.42***	1.21–1.67	1.47***	1.23–1.75	1.42***	1.21–1.66	1.47***	1.23–1.75
Depressive symptoms	1.00	0.93–1.08	1.02	0.94–1.10	1.00	0.93–1.08	1.02	0.94–1.10	1.00	0.93–1.08	1.02	0.94–1.10
Neighborhood quality (poor)	1.33*	1.02–1.71	1.26	0.93–1.72	1.38*	1.01–1.88	1.34	0.93–1.92	1.20	0.72–2.01	1.11	0.59–2.08
Neighborhood quality × race	-	-	-	-	0.79	0.46–1.37	0.68	0.39–1.19	-	-	-	-
Neighborhood quality × gender	-	-	-	-	-	-	-	-	1.20	0.70–2.07	1.27	0.65–2.44

CMC chronic medical conditions, *SRH* self-rated health

# *p < 0.1*;

* *p* < 0.05;

** *p* < 0.01;

*** *p < 0.001*

Table 4

Association between neighborhood safety and all-cause mortality based on race

	Whites				Blacks			
	All causes		Internal causes		All causes		Internal causes	
	HR	95%CI	HR	95%CI	HR	95%CI	HR	95%CI
Women	0.50***	0.42–0.59	0.48***	0.40–0.57	0.68***	0.54–0.85	0.67**	0.52–0.86
Age	1.09***	1.08–1.10	1.09***	1.09–1.10	1.07***	1.06–1.08	1.07***	1.06–1.09
Education (years)	0.98	0.96–1.01	0.98	0.95–1.01	1.00	0.97–1.03	1.01	0.97–1.04
Income	0.94**	0.91–0.97	0.94***	0.91–0.97	0.90**	0.85–0.97	0.92*	0.85–1.00
Smoking (current smoking)	1.81***	1.49–2.20	1.92***	1.57–2.35	1.50***	1.22–1.84	1.53***	1.27–1.84
Drinking (drinks per month)	1.00	1.00–1.00	1.00	1.00–1.00	1.00	1.00–1.01	1.00	1.00–1.00
Exercise	0.88**	0.83–0.95	0.89***	0.83–0.95	0.90#	0.80–1.00	0.92#	0.83–1.01
Obese	1.04	0.86–1.25	1.08	0.88–1.33	1.12	0.89–1.42	1.02	0.79–1.31
CMC	1.17***	1.11–1.23	1.17***	1.10–1.24	1.12#	1.00–1.25	1.14*	1.00–1.30
SRH	1.49***	1.25–1.78	1.51***	1.24–1.84	1.08	0.90–1.29	1.22#	0.99–1.51
Depressive symptoms	1.02	0.93–1.11	1.03	0.94–1.13	0.93	0.85–1.03	0.92	0.82–1.03
Neighborhood safety (poor)	1.72**	1.14–2.59	1.75**	1.16–2.63	0.94	0.64–1.39	0.95	0.60–1.51

CMC chronic medical conditions, *SRH* self-rated health

p < *0.1*;

* *p* < 0.05;

** *p* < 0.01;

*** *p* < *0.001*

Table 5

Association between neighborhood quality and all-cause mortality based on race

	Whites				Blacks			
	All causes		Internal causes		All causes		Internal causes	
	HR	95%CI	HR	95%CI	HR	95%CI	HR	95%CI
Women	0.50***	0.43–0.60	0.49***	0.41–0.58	0.69***	0.55–0.87	0.68**	0.53–0.88
Age	1.09***	1.08–1.10	1.09***	1.09–1.10	1.07***	1.06–1.08	1.07***	1.06–1.09
Education (years)	0.98	0.96–1.01	0.98	0.95–1.01	1.00	0.97–1.03	1.01	0.97–1.04
Income	0.94***	0.91–0.98	0.94***	0.91–0.97	0.91**	0.85–0.96	0.92*	0.85–0.99
Smoking (current smoking)	1.83***	1.51–2.22	1.93***	1.59–2.35	1.51***	1.24–1.86	1.54***	1.28–1.86
Drinking (drinks per month)	1.00	1.00–1.00	1.00	1.00–1.00	1.00	1.00–1.01	1.00	1.00–1.00
Exercise	0.88**	0.82–0.94	0.89***	0.83–0.95	0.90#	0.80–1.01	0.92#	0.83–1.01
Obese	1.04	0.87–1.25	1.09	0.89–1.33	1.12	0.89–1.41	1.03	0.80–1.32
CMC	1.17***	1.11–1.23	1.17***	1.10–1.23	1.11#	0.99–1.24	1.13#	1.00–1.29
SRH	1.50***	1.26–1.79	1.52***	1.25–1.86	1.06	0.88–1.28	1.19	0.96–1.48
Depressive symptoms	1.01	0.92–1.11	1.03	0.93–1.13	0.94	0.85–1.03	0.93	0.83–1.04
Neighborhood quality (poor)	1.40*	1.02–1.92	1.35	0.94–1.95	0.96	0.63–1.45	0.81	0.54–1.21

CMC chronic medical conditions, *SRH* self-rated health

p < *0.1*;

* *p* < 0.05;

** *p* < 0.01;

*** *p* < *0.001*