



Neighborhood perceptions and allostatic load: Evidence from Denmark



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ARTICLE INFO

Article history:

Received 26 October 2015

Received in revised form

4 March 2016

Accepted 25 April 2016

Keywords:

Neighborhood
Allostatic load
Chronic stress
Denmark

ABSTRACT

An influential argument explaining why living in certain neighborhoods can become harmful to one's health maintains that individuals can perceive certain characteristics of the neighborhood as threatening and the prolonged exposure to a threatening environment could induce chronic stress. Following this line of argumentation, in the present study we test whether subjective perceptions of neighborhood characteristics relate to an objective measure of stress-related physiological functioning, namely allostatic load (AL). We use a large dataset of 5280 respondents living in different regions of Denmark and we account for two alternative mechanisms, i.e., the objective characteristics of the living environment and the socio-economic status of individuals. Our results support the chronic stress mechanisms linking neighborhood quality to health. Heightened perceptions of disorder and pollution were found related to AL and this relationship was particularly robust for women.

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1. Introduction

The idea that the characteristics of the living environment can “get under the skin” and make people sick has received a lot of attention from the social sciences (Dalgard and Tamsb, 1997; Ross and Mirowsky, 2006; Sampson et al., 2002). The neighborhoods, i.e., the small geographical areas where individuals live and spend most of their time, have been a focus of this scholarly interest, and researchers have tried to untangle the reasons why living in certain neighborhoods can become harmful to one's health (Agye-mang et al., 2007; Baum et al., 2009; Bernard et al., 2007; Browning and Cagney, 2002; Wen et al., 2003). One of the proposed explanations maintains that individuals can perceive certain characteristics of the neighborhoods as threatening (Burdette and Hill, 2008; Hill et al., 2005; Ross and Mirowsky, 2001). Living in an environment that is appraised as threatening induces chronic psychological stress, and the chronic stress response can cause adverse physiological changes that in the long run might impair health (Thoits, 2010). In the present paper we follow this line of argumentation and test the hypothesis that subjective perceptions of neighborhood characteristics relate to physiological indicators of a chronic stress response.

A steadily increasing body of research examined the relationship between neighborhood characteristics and the stress-exposure consequences for individuals (Gustafsson et al., 2014; Theall et al., 2012) but the results of the empirical tests were not always supportive (Jiménez et al., 2015). Besides this inconsistency in previous results that urge for future investigations, we point to three major differences between our research strategy and those employed by previous researchers. First, most of previous research measured neighborhood quality by using objective indicators of neighborhood disadvantage that were argued to trigger the stress response of the body (Bird et al., 2010; Gustafsson et al., 2014; Stein-Merkin et al., 2009; Theall et al., 2012). However, it is important to keep in mind that psychological stress can be understood as “a particular relationship between the person and the environment that is *appraised* by the person as taxing or exceeding his or her resources and endangering his or her well-being” (Lazarus and Folkman (1984) as cited in Cohen et al. (1997)) [italics added]. Furthermore, the strength of the relationship between objective and subjective measures of neighborhood quality was evaluated to be weak to moderate (Kamphuis et al., 2010), although previous research has showed that perceptions of neighborhood quality did mediate the relationship between objective neighborhood characteristics and health (Ross and Mirowsky, 2001; Weden et al., 2008). Based on the above, we maintain that a more direct test of the neighborhood stressor effect requires the subjective appraisal of the neighborhood quality by the residents, and this is the strategy that we employ in our study.

Second, when researchers used subjective appraisals of

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neighborhood quality, the stressor effect was most times measured through self-reported physiological states (Burdette and Hill, 2008). For example, Hill and colleagues (2005) measured self-reported physiological distress as an index of several symptoms, e.g., faintness or dizziness, nervousness or shakiness inside or heart or chest pain, and found that more negative neighborhood perceptions were associated with higher physiological distress. While this approach is a pragmatic solution for the lack of more objective measures of physiological distress, it is not clear to what extent these self-reported measurements reflect measurable physiological deregulation. The main limitation of studies based on self-reports is the considerable influence of the respondents psychological traits and states such as negative affectivity or neuroticism on these self-reported measures, thus creating a risk for reporting bias (Bosma et al., 1997; Macleod et al., 2002; McCrae, 1990; Rod Nielsen et al., 2006). In this study we are able to address this limitation by taking advantage of the recent developments in the stress physiology literature and using an objective measure of stress-related physiological functioning, namely allostatic load (AL) (McEwen, 1998), a measure that can be understood as the price that the body pays when constantly being in a state of alertness due to chronic stress exposure.

Referring specifically to the relationship between neighborhood perceptions and AL, we note that it has rarely been put to the test. To our knowledge, there are only two studies examining this relationship and both found that individuals reporting worse perceived neighborhood conditions also had higher level of AL. However, these studies have used data from the same small scale survey from the US of 919 individuals (Schulz et al., 2012, 2013). To this extent it is unknown if these results are valid for larger populations living in different social contexts. In this study we use a much larger dataset of 5280 respondents living in different regions of Denmark.

Third, previous research investigated and provided evidence for the link between neighborhood quality and separate biomarkers that contribute to the composite AL measure, e.g., cortisol (Dulin-Keita et al., 2010), BMI (Burdette and Hill, 2008; Sundquist et al., 1999) or cardiovascular disease (Sundquist et al., 2004). In this regard, we align ourselves to the conceptualisation of chronic stress response as a cumulative “wear and tear” of the body that spreads across several interrelated physiological systems (McEwen, 1998). To this extent we regard the use of a composite score of multiple biomarkers that cover the multisystem biological dysregulation a more adequate measure of chronic stress response than any of the component markers.

While the focus of the present study is on the relationship between neighborhood perceptions and AL, there might be other potential mechanisms linking the quality of the neighborhoods to health. First, scholars have argued that the very structure of the neighborhoods could affect the health of individuals (Robert, 1999). Neighborhoods have certain objective characteristics in regard to the services, the infrastructure, or the physical environment that can directly impact health, e.g., limited access to health care facilities or air pollution (Bernard et al., 2007). This particular alternative mechanism is relevant to account for because the objective characteristics of the living environment will be to some extent reflected in the way residents perceive their neighborhoods (Elo et al., 2009). Subsequently, it is important to test whether the perceptions contribute to health risks above and beyond those objective characteristics.

Another alternative explanation of why individuals residing in poor quality neighborhoods have on average worse health than individuals residing in better quality neighborhood is that individuals with low socio-economic position (SEP), who cannot afford to live in more affluent areas, live in these areas. Low SEP is a well-known predictor of poor health and thus a potential

confounder of the relationship between neighborhood perceptions and physiological functioning, which is the reason why we need to account for the individuals' SEP in our models.

To sum up, the research question that guides this study is: to what extent perceptions of the neighborhood relate to the level of AL above and beyond individual and contextual characteristics? In order to answer the research question, we use a sample of 1647 females and 3633 males from the Copenhagen Aging and Midlife Biobank (CAMB) study (Avlund et al., 2014; Lund et al., 2015), a choice motivated by the extensive sample and the outstanding quality of the data and of the biomarker information.

2. Theoretical background

In order for an environmental factor to act like a stressor it has to be appraised as a threat, a challenge, or a situation in which some damage or loss to the individual has occurred or can occur (Folkman et al., 1986). Neighborhoods can become threatening places when the residents are confronted with cues suggesting that the social control is broken, that the residents do not respect each other or each other's property and when they feel that they are in danger of something bad to happen (Ross, 2000). The perceptions of a threatening environment could be elevated when residents are confronted with cues of criminality and anti-social behaviour, such as observing gangs or destroyed private or public property among others. The overall low quality of the infrastructure or services available in certain disadvantaged neighborhoods could also signal that the authorities have failed to maintain order or are unable to ensure the well-being of the residents. In turn, this could induce a feeling of increased vulnerability in the face of potential harm and could result in heightened fear (Hill et al., 2005). Authors such as Hill et al. (2005) and Ross and Mirowsky (2001) argue that the perceptions of a noxious environment and the increased sense of threat and fear experienced by individuals would trigger the stress response of the body. Furthermore, because people tend to live fairly long periods in the same place, this stressor effect will last for prolonged periods and thus, living in certain areas would become a chronic stressor for the residents.

Chronic stress is known to have harmful effects on physical health (Lantz et al., 2005; Thoits, 2010). The AL theory has been proposed to explain the mechanisms underlying this association. During acute stress response, the sympathetic-adrenal medullary (SAM) system and hypothalamic-pituitary-adrenal (HPA) axis increase the secretion of stress hormones catecholamines and glucocorticoids. These hormones modulate the activity of metabolic and cardiovascular systems in order to help the body mobilize energy (McEwen, 2003a). While this response is adaptive in the short term, as it helps to deal with the increased demands of a stressful situation, repeated or chronic over-activation of the SAM system and the HPA axis and inadequate recovery may lead to dysregulation of multiple interconnected physiological systems, for example elevated systolic and diastolic blood pressure and visceral fat deposition (Juster et al., 2010). This cumulative dysregulation of multiple physiological systems has been termed AL (McEwen and Stellar, 1993). Measures of AL, derived from multiple biomarkers, capture the multidimensionality of physiological changes resulting from chronic stress. Even when changes in individual biomarkers are modest and not predictive of health outcomes, it has been argued that the confluence of changes across multiple physiological systems constitutes a health risk (McEwen and Seaman, 1999; Seaman et al., 2010, 2001b). Research has linked high levels of AL to increased risk of cardiovascular disease, to faster physical and cognitive decline later in life, and to mortality (Karlamañgla et al., 2006; Seaman et al., 2001a).

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