

The Perception of Stress and its Impact on Health in Poor Communities

Sue A. Kaplan · Vivienne Patricia Madden ·
Todor Mijanovich · Ellenrita Purcaro

© Springer Science+Business Media, LLC 2012

Abstract With the increased understanding of the relationship between stress and disease, the role of stress in explaining persistent disparities in health outcomes has received growing attention. One body of research has focused on allostatic load—the “wear and tear” that results from chronic or excessive activation of the stress response. Other research has looked at the link between stress and health behaviors. In this study, we conducted 7 focus groups with a total of 56 people to understand how people living in Highbridge, South Bronx, New York, a low income community with poor health outcomes, perceive stress and its relationship to health. Focus group participants described a direct causal pathway between stress and poor health as well as an indirect pathway through health behaviors, including uncontrolled eating, sleep deprivation, substance abuse, smoking, violence and aggression, and withdrawal and inactivity. Participants articulated a number of theories about why stress leads to these unhealthy behaviors, including self-medication, adaptive behavior, discounting the future, depletion of willpower, and competing priorities. Their nuanced understanding of the

link between stress and health elucidates the mechanisms and pathways by which stress may result in disparities in health outcomes and create challenges in changing health behaviors in poor communities like the South Bronx.

Keywords Health disparities · Chronic stress · Health behaviors · Community based participatory research

Introduction

It has been well established that people of lower socioeconomic status (SES) have worse health outcomes across a wide variety of diseases [1]. Recently, with the increased understanding of the relationship between stress and disease, the role of stress as a mechanism by which “SES can ‘get under the skin’” has received a great deal of attention [2]. One growing body of research has focused on allostatic load—the “wear and tear” that results from chronic or excessive activation of the stress response [3]. Other research has looked at the link between stress and health behaviors. In some studies, unhealthy behaviors are viewed as a mechanism to alleviate the symptoms of stress [4]. In others, poor health choices are seen as resulting from “ego depletion” [5] or a reduction in self-regulatory capacity that occurs in response to the strain of difficult decision making and other stressors experienced in poor communities [6]. In this study, we seek to understand how people living in one such community perceive stress and its relationship to health and health behaviors.

Setting and Methods

For over a decade, Bronx Health REACH, a community health initiative funded by the Centers for Disease Control

S. A. Kaplan (✉)
Department of Population Health, New York University School
of Medicine, 550 First Avenue, VZ30 6th Floor, 625, New York,
NY 10016, USA
e-mail: sue.kaplan@nyu.edu

S. A. Kaplan · T. Mijanovich
The Robert F. Wagner Graduate School of Public Service,
New York University, 295 Lafayette Street, 2nd Floor,
New York, NY 10012, USA

V. P. Madden · E. Purcaro
The Highbridge Community Life Center, 797 Ogden Avenue,
Bronx, NY 10452, USA

and Prevention and led by the Institute for Family Health, has been implementing a far-reaching program focused on eliminating disparities in access to high quality health care and on improving the health-related behaviors that are risk factors for diabetes and related cardiovascular disease in the South Bronx, New York [7]. Although some of these initiatives have created social support networks for participants, particularly for those who are part of the faith-based initiative [8, 9], none has attempted directly to address the problem of stress in the community.

Growing out of work together in the REACH coalition, the Highbridge Community Life Center (HCLC) joined together with New York University, the Bronx District Public Health Office of the New York City Department of Health and Mental Hygiene, 20 community-based organizations and health care providers, and community residents to understand and address the barriers to good health in Highbridge, a community located in the southwest Bronx with among the worst health outcomes in New York City [10]. As we began working with community partners and meeting with community residents, the issue of “stress” as a fundamental cause of a wide array of health problems was raised repeatedly and forcefully. In keeping with the community-based participatory approach that has guided our work in Bronx Health REACH [11, 12], the Highbridge leadership decided to explore directly the community perspective on the relationship between stress and health.

Over a three-month period in 2009–2010, we held 7 focus groups with a total of 56 people in the Highbridge community. Qualitative methods were selected because this was an exploratory study in which we sought to understand multiple perspectives on the potentially complex and multidirectional interaction among stress and a variety of health outcomes and behaviors. In order to assure a varied and roughly representative group of participants, we used a broad spectrum of community institutions—social service agencies, afterschool programs, adult education classes—to recruit focus group members. 17 (30 %) of the participants were black; 31 (55 %) of the participants were Hispanic/Latino; 1 (2 %) was non-Hispanic white; 6 (11 %) were biracial; 1 (2 %) did not identify her race or ethnicity. 32 (57 %) were men and 24 (43 %) were women. The average age was 35 (ranging from 18 to 70).

The focus groups were held at the community-based organizations often immediately following or as part of a previously scheduled meeting or class. All of the focus groups were conducted in English by two leaders, one a professor (SAK) and the other a social worker and long-time employee of HCLC (VPM). The sessions lasted approximately 1.5 h. We paid participants \$20 as compensation for their time. Informed consent was obtained from all participants. The study protocols were approved by the New York University institutional review board.

The focus group protocol was developed in collaboration with community partners. Following introductions and a review of ground rules, the facilitators asked participants why they thought that the health of community residents in Highbridge was worse than other more affluent parts of the City. Participants identified three causal factors: unhealthy behaviors (including unhealthy diets and lack of exercise); an inadequate and unresponsive health care system; and most commonly, “stress” resulting from poverty, poor housing, violence, discrimination, and unemployment. In every group at least one, and usually many, of the participants attributed the poor health in their community to “stress.” The focus group facilitators used those comments as a springboard to ask others if they agreed that stress affects people’s health. In these discussions, we asked participants to define what they meant by stress and to describe in detail the mechanisms by which stress might lead to a poor health outcome.

All of the focus groups were digitally recorded and transcribed verbatim by a professional transcription service. Each transcript was first reviewed for accuracy and then was coded by the first author using ATLAS.ti Scientific Software Development. In the first phase of coding, codes were drawn from the interview guide and research questions. In the second phase, the research team created and applied inductive codes to identify additional themes and patterns [13]. The authors, two of whom are community partners (VPM, EP), met numerous times over the course of the data collection and analysis to identify emerging themes and agree upon a final framework. Ultimately, the data were summarized in reports generated for each domain and representative quotes were selected to illustrate key findings.

Presentations of preliminary findings were made at two Bronx Health REACH meetings during which feedback and reactions were sought from those present. Findings were also presented and feedback provided at a full meeting of the Highbridge coalition, which was attended by 60 people, including participants from two of the focus groups, representing 20 organizations.

Findings

All focus group participants felt strongly that the stressors experienced in their community lead to poor health outcomes. Some identified stress as an underlying cause of illness, for example, high blood pressure or heart disease. Others linked stress to harmful health behaviors, such as unhealthy eating or smoking. Participants’ experience of stress, and their perceptions and explanations for the direct and indirect ways that stress may result in poor health, are discussed below.

Defining Toxic Stress

Scientific literature differentiates between “toxic” or chronic stress that can result in physiological risk, and shorter-term, manageable stress that can sharpen attention and motivate and enhance performance [14, 15]. In describing the impact of stress on health, focus group participants made the same distinction. As one woman asked the focus group leader, “Are we talking about *your* kind of stress or *my* kind of stress?” Later, she clarified: “People in this room, eight out of ten of us have a history of drug abuse. Our world, our stress, is totally different from yours.” Another participant described the sheer quantity of stress in her community saying, “I think it all comes from your station in life. You know, poor folks always got something ain’t right...Not one thing that come, it be an avalanche.”

The Stress of Low SES

A strong association between SES and exposure to a range of social and environmental stressors has been well-documented [1, 16, 17]. Focus group participants identified many such stressors as specifically creating a risk for poor health:

- Financial problems (unemployment, food insecurity)
- Housing (overcrowding, residential instability, homelessness)
- Family members’ health problems (including HIV, addiction, asthma, diabetes, depression)
- Family conflicts (domestic violence, discipline issues with children)
- Concern about health and safety of children (school-based violence, gangs, drugs)
- Employment conditions (long work hours, nightshift work)

Stress as Contagion

For each of these issues, people noted that stress can be “contagious.” For example, the needs of a family member or friend who becomes unemployed, ill or homeless can “quickly become your need,” by generating demands on limited resources or creating a sense of guilt or powerlessness. In every focus group, people described these kinds of transmitted or shared pressures:

When I look at my friends and family, I think stress-like ‘worry-ation’—just worrying whether or not your family member is a certain way, and you want to help them get to where you want them to be. Like I have my mom who has diabetes; I worry about her constantly because I love her and I feel like she took care of me, and I just want to be able to do the same thing and take care of her.

It’s like something falls down on you. It’s not that you want to give up, but it makes you feel like it’s a load you’re carrying when you got to take care of your mother, your father, or whoever.

A Torn Safety Net

Studies suggest that people living in poor communities have fewer resources that can serve to buffer stressful events or circumstances, and are therefore more vulnerable to their impact [1, 18]. Indeed, many of the participants described how taking on the burden of a family member or friend strained already limited resources: for example, bringing extended family members into an already crowded apartment, or working “doubles” (i.e. double shifts) to support a family member who has been laid off. In every such example, the impact of the stressor was magnified by an underlying vulnerability.

The Role of Social Support

Positive social networks, which can offer emotional support or tangible help in coping with stress, can be difficult to create in environments in which there is overcrowded housing, fear of crime, and financial strain. Not surprisingly, some focus group participants described being very socially isolated, and many complained that there was no place to turn to for help. Several noted that they deliberately rely on friends who do not live in the neighborhood and who therefore are not enmeshed in the day-to-day conflicts around them. Others commented that their social networks directly strengthen the connection between stress and poor health by promoting and reinforcing poor health behaviors, including drug use, drinking, and overeating. For example, in response to the question “Do your friends help and support you when you feel stressed,” one participant answered, “Yeah, they bring me another bottle...They’re trying to cheer me up by bringing me cup after cup.”

The Stress of Stigma

A number of studies, including the seminal work of Ger-nomius [19] and Williams [20], have suggested that the stress of coping with racism and marginalization may be in part responsible for the persistent racial and ethnic disparities in health outcomes. A related body of work by Marmot, Wil-kinson and others has linked relative social standing to health through biological and behavioral pathways arising from stress [21]. In several focus groups participants argued about whether racism and discrimination are, indeed, sources of stress. Nevertheless, many noted that their stress was amplified by an overarching feeling of being devalued. In every group, people recounted humiliating encounters with

the police, schools, health care providers, and social service agencies. And many identified a broader sense of inequity as a source of debilitating stress. One young man explained how the neighborhood conditions send a message about his place and value in society:

[The neighborhood] is a reminder of where you're at and what you're stuck in....It's not like looking out a window and seeing a better picture. It's more like looking out a window and seeing your own reflection.

Another man said that he is "stressed...because of what I see around me:"

[W]e live in the United States, one of the richest places or nation...people sleeping in the streets, you have homeless issues, you have drug issues. The only time cops come in this neighborhood is when they're harassing somebody.

The Direct Causal Pathway Between Stress and Poor Health

A growing body of research has sought to understand the physiological risks associated with exposure to stressors and to identify resulting risks for disease. Although the

mechanisms and measures are debated, chronic stress has been linked to cardiovascular disease [22], immune suppression [23], the accumulation of abdominal fat [24, 25], declines in cognitive functioning [26], and depression [27], among other diseases.

Focus group participants similarly attributed a wide array of diseases directly to stress. Cardiovascular disease, including hypertension, was mentioned most frequently (19 times), followed by depression (5 times), muscle pain (2 times), migraines (2 times), and thyroid problems, fibromyalgia, and aneurisms (1 time for each). In every group, participants noted the multidirectional interaction between stress and poor health. For example, stress due to unemployment may lead to poor health; poor health itself may be a stressor; and debilitating illness can result in unemployment.

The Indirect Pathway Between Stress and Poor Health Through Health-Related Behaviors

Although a handful of focus group participants described constructive ways of coping with stress (pursuing hobbies, walking the dog, exercising), many more said that stress led them to engage in harmful behaviors, including unhealthy eating (overeating, eating high fat foods, erratic

Table 1 Health-related behavior resulting from stress with representative quotes

Themes	Quotations
Uncontrolled eating	"I'm an emotional eater...If I'm upset or angry, I'm going straight for the junk food...Junk food is comfort food...When I'm upset, my thing is the big bag—the Tostitos chips. I could eat three of those in one day if I'm upset." " [In response to stress], I eat more and get big...I eat junk food. I love chocolate...It makes me feel good."
Sleep deprivation	" [Stress] alone might keep you up at night so you're not sleeping properly. And then you're not eating right because the appetite is not right." "Lack of sleep, that's one of the most issues that we have. You can't function, you can't work and people start getting sick."
Substance abuse	"When I feel stress, I don't eat. I drink...I drink wine, alcohol, champagne. I'll even take a sleeping pill. The more stressed, I run and get another bottle. I'm getting more liquor, and the bottle is hitting me more. I'm thinking about what I'm stressed about. But the problem is still there." "Drinks left and right...That's what I don't like about drinking or smoking. You're mellowed the first couple hours. Then it just hits you. It's even worse."
Smoking	"When I'm stressed, I want to smoke a cigarette, and then I close myself in." "I tend to smoke more when I'm upset because, for me, it gives me a chance to think."
Violence and aggression	" [When I am stressed] I am very nasty. I'm vicious. I have claws. I'm like a tiger or a lioness. Stay away from me. I don't like myself. I feel evil. I can destruct anything if you put it in the palm of my hand." "Then I'm stressed...I got an attitude and then I'm snapping at everybody. Because I am generally P.O.ed." "I got laid off and I noticed that I got more anxiety, like taking out my problems on other people. I had my girlfriend and I found myself yelling at her. I'm just taking out my frustrations out on her, causing me to let out my anger towards other people, and that's what I noticed about myself. She's telling me, 'I'm seeing another side of you that I haven't seen before.'"
Withdrawal and inactivity	"When I'm stressed, I just feel like I don't want to do nothing. I don't want to be around people, I just want to be by myself...I don't want to go outside, I don't want to talk to nobody." "You hear that you relieve stress by exercising. I'm not that type of person. I do the total opposite. I just sit and do nothing." "I just don't want to be bothered; leave me alone. I'm serious. Leave me alone. Leave me alone."

eating), sleep deprivation, substance abuse, smoking, violence and aggressive behavior, and withdrawal and inactivity. Participants noted that these behaviors affect and interact with each other: stress may “keep you up at night so you’re not sleeping properly and then you’re not eating right because the appetite is not right, and so all of this is interrelated.” In addition, unhealthy behaviors may serve to exacerbate the underlying stress: succumbing to drug addiction can lead to crime and “with that comes stress. The life of a drug addict is very stressful. ‘Am I going to get caught? Is someone going to rob me? If I rob them will they shoot me?’” (Table 1).

Theories About Why Stress Leads to Harmful Health Behaviors

Focus group participants articulated a number of theories about why stress leads to these unhealthy behaviors. Many reported that they use overeating, drinking, and substance abuse as a form of self-medication or self-soothing. For example, one woman berated herself for eating “junk food” in response to stress, but said that overeating provides a form of “comfort”: “I’m upset with myself because I’m eating it [Tostitos chips], but at the same time, I’m like, okay—It’s calming me down. It’s calming me down.” Similarly, in several focus groups, participants described using alcohol or drugs to “numb” or “medicate” themselves: “I get drunk and I just get relaxed because I go into my own space...I do my drinking...until I get numb.” In one interchange, a participant noted that his “response to stress is to take drugs, to numb it,” and another agreed, “Yeah, medicate it.”

Several participants described smoking as also having a calming or “mellow[ing]” effect. Others noted that pausing to have a cigarette serves as a useful strategy to deescalate or defuse a stressful situation, allowing the smoker to remove herself physically or to disengage emotionally:

My cigarettes help me cope with stress. When I get ready to pop...I leave and go smoke a cigarette. I smoke a cigarette, I can think.

I tend to smoke more so when I’m upset because, for me, it gives me a chance to think.

All participants were aware that overeating, smoking, and substance abuse can lead to poor health outcomes, but several noted that their willpower to resist these unhealthy behaviors was depleted after a long and stressful day. As one woman noted, “So sometimes I’ll tell myself I need a cigarette knowing that I don’t need it...It’s mind over matter, but when you got so much that’s pound on you, sometimes you do things that you know you’re not supposed to do, and me, it’s smoking cigarettes.”

For some participants, stress, sometimes in conjunction with sleep deprivation, made it hard to notice signals of hunger or satiety, resulting in erratic eating behaviors. Although many participants reported overeating in response to stress, quite a few also described forgetting to eat or losing one’s appetite as a result of stress. One woman explained that in response to stress “sometimes the body...doesn’t even get a hold of me any more...You know that you didn’t eat, but the body just won’t even feel hungry any more.” Another reported, “I actually eat less when I feel stressed. I forget to eat sometimes. I think so much about things going on that I forget to eat.” Only later would she realize that she was hungry: “Then I eat a lot more. I don’t realize how hungry I was until I step out to eat.” Another participant described the interaction between appetite and sleep: “If I start to worry, my appetite is non-existent. I don’t sleep, so I don’t think well...My whole thought process is messed up because one of the main things our bodies need is rest.”

Some participants explained that they lacked the motivation to engage in healthy behaviors; the effort felt pointless given the bleak future they saw ahead of them. One young man questioned whether caring about one’s health mattered at all: “Why bother?” he asked, “All of the black guys always getting shot; they always dying anyway.” Another participant, also a young African American man, expressed a similar sense of the futility. Investing in healthy behaviors now seemed pointless given his sense of hopelessness: “In society today, from my ancestors going up, we’ve always got a raw deal...Black and Hispanic people, even when they try to do something with they life...they always get knocked down.”

Finally, many described competing priorities (work, childcare, finding a job, providing food for children) that take precedence over health promoting behaviors and affect the capacity to get needed care. As one woman explained, “You don’t have no time for exercise, and you don’t even have no time to eat good food...You buy junk food to keep on moving.” Another man described the plight of his sister who had become obese: “A large number of us bear children at a young age and pay more attention to their children, not themselves. My sister has five kids and she doesn’t worry about exercising her body because she is busy taking care of her kids.”

Discussion

In describing the link between stress and health, focus group participants did not see a need to choose between biological and behavioral explanations. Rather, as illustrated in Fig. 1, they described a *direct* causal pathway between stress and poor health as well as an *indirect* pathway through health behaviors.

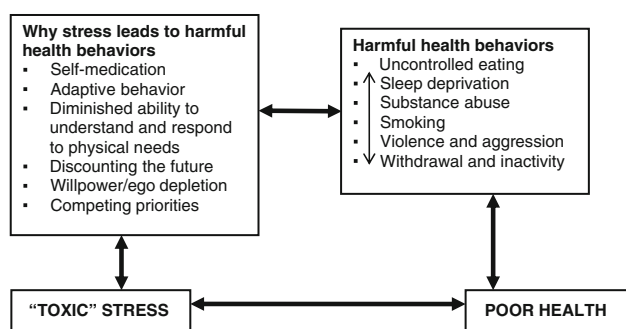


Fig. 1 Focus group participants' perception of the effects of stress on health outcomes

Moreover, the participants were remarkably insightful about the potential interactions among stress and health-related behaviors, as illustrated by the multiple bidirectional arrows in Fig. 1. For example, their observations about the impact of stress on sleep, and the affect of sleep deprivation on other health behaviors, are supported by studies that have shown that sleep deprivation can harm health directly by raising blood pressure and lowering bone density, and it can affect other health behaviors, for example, by increasing appetite through its impact on hormones [28, 29].

Similarly, the insight that some behaviors are a form of self-medication, which in the short-term reduces the stress response, also has scientific support. Several studies have shown that smoking can reduce anxiety [30] and produce a sense of well-being [31]. Other studies have shown that overeating or eating of high fat or “comfort” foods can serve as a defense mechanism that attenuates the stress response [32–35]. Ultimately, these behaviors can, of course, have a deleterious impact on health [36], but in a poor community where, like many of the focus group participants, people are more likely to discount the future, these longer term consequences may carry less weight [37, 38].

Finally, participants' perception that coping with stressors throughout the day diminishes the ability to resist unhealthy temptations (overeating, smoking) is also supported by research that suggests that self-regulatory capacity may be a limited resource. Studies have found that subjects who are placed in circumstances that call upon willpower, self-restraint or suppressing of emotion subsequently have reduced persistence and self-control, and therefore diminished capacity to resist temptations [39]. Certainly, the “avalanche” of stressors described by the focus group participants would likely result in such a depleted state, causing them to be more susceptible to making poor health choices.

The notion that stress is a pathway by which low SES results in poor health resonates with many who live or work in poor communities. Our community leaders—both community residents and people working in Highbridge as

educators, doctors, social workers, administrators—believe that stress is a risk factor for other risk factors [40] that helps to explain the persistence of disparities in health outcomes and the challenges in changing health behaviors in poor communities like the South Bronx. Based on their lived experience, the participants in our focus groups provided a nuanced understanding of the mechanism and pathways by which this may occur.

Limitations

This study has several limitations. First, the definition of stress and how it is measured—in terms of both biological markers and subjective experience—is problematic and has been debated in many studies. Because the word has great currency in popular discourse, its meaning is not always clear when used colloquially. As many focus group participants noted, “my” stress may be quite different from “your” stress. Thus, although we explored in detail how participants defined and explained their experience of stress, it is possible that the term was at times ambiguous.

Second, although our participants were a diverse sample, they were not selected randomly and may not be perfectly representative of their larger communities. However, by partnering with a wide range of community based organizations to recruit participants, and through the richness of the data we collected, we sought to assure relevance to a broad spectrum of circumstances and settings.

Perhaps the most significant limitation of the study is one that has been felt acutely by community leadership. At what point on the spectrum is it best to intervene, and what tools are available and most effective? Many efforts have focused on managing the *health consequences* of social and environmental stressors through screening and treatment of disease. Other programs have been designed to influence *health behaviors and choices* that are proximate risk factors for disease. Less has been done to strengthen social supports and social networks [41] or to create buffers or support resiliency, although some early childhood interventions hold promise [42]. If we continue to focus on modifying the “surface causes” [43] of poor health, and fail to address neighborhood conditions and underlying social inequities, we should not be surprised at the persistence of health disparities in poor communities.

Acknowledgments This work was made possible by a grant from the United Hospital Fund of New York with additional support from Bronx Health REACH/Center for Excellence in the Elimination of Disparities through a Legacy Grant from the Centers for Disease Control and Prevention. Significant assistance was provided by the

Highbridge Community Life Center, Project Samaritan, Highbridge Voices, and the Bronx District Public Health Office of the New York City Department of Health and Mental Hygiene, and colleagues Beth Weitzman (NYU) and Maxine Golub and Charmaine Ruddock (Institute for Family Health).

References

- Baum, A., Garofalo, J. P., & Yali, A. M. (1999). Socioeconomic status and chronic stress: does stress account for SES effects on health? *Annals of the New York Academy of Sciences*, *896*, 131–144.
- Lupien, S. J., King, S., Meaney, M. J., & McEwen, B. S. (2001). Can poverty get under your skin? Basal cortisol levels and cognitive function in children from low and high socioeconomic status. *Development and Psychopathology*, *13*, 653–676.
- McEwen, B. (1998). Stress, adaptation and disease: allostatics and allostatic load. *Annals of the New York Academy of Sciences*, *840*, 33–44.
- Sinha, R. (2008). Chronic stress, drug use, and vulnerability to addiction. *Annals of the New York Academy of Sciences*, *1141*, 105–130.
- Baumeister, B., Bratslavsky, E., Muraven, M., & Tice, D. M. (1998). Ego depletion: is the active self a limited resource? *Journal of Personality and Social Psychology*, *74*(5), 1252–1265.
- Evans, G. W., & English, K. (2002). The environment of poverty: multiple stressor exposure, psychophysiological stress, and socioemotional adjustment. *Child Development*, *73*(4), 1238–1248.
- Calman, N. (2005). From the field: making health equality a reality: the Bronx takes action. *Health Affairs*, *24*, 2491–2498.
- Kaplan, S. A., Ruddock, C., Golub, M., et al. (2009). Stirring up the mud: using a community-based participatory approach to address health disparities through a faith-based initiative. *Journal of Health Care for the Poor and Underserved*, *20*, 1111–1123.
- Kaplan, S. A., Calman, N. S., Golub, M., Ruddock, C., & Billings, J. (2006). The role of faith-based institutions in addressing health disparities: a case study of an initiative in the southwest Bronx. *Journal of Health Care for the Poor and Underserved*, *17*(2), 9–19.
- Olson, E. C., Van Wye, G., Kerker, B., Thorpe, L., & Frieden, T. R. (2006). *Take care Highbridge and Morrisania* (2nd ed., Vol 6, no. 42, pp 1–16). NYC Community Health Profiles.
- Kaplan, S. A., Dillman, K. N., Calman, N. S., & Billings, J. (2004). Opening doors and building capacity: employing a community-based approach to surveying. *Journal of Urban Health*, *81*, 291–300.
- Kaplan, S. A., Calman, N. S., Golub, M., Davis, J. H., & Billings, J. (2006). Racial and ethnic disparities in health: a view from the south Bronx. *Journal of Health Care for the Poor and Underserved*, *17*, 116–127.
- Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3rd ed.). Thousand Oaks: SAGE Publications.
- McEwen, B. S., & Stellar, E. (1993). Stress and the individual: mechanisms leading to disease. *Archives of Internal Medicine*, *153*, 2093–2101.
- McEwen, B. S. (2002). Protective and damaging effects of stress mediators: the good and bad sides of the response to stress. *Metabolism*, *51*, 2–4.
- Lantz, P. M., House, J. S., Mero, R. P., & Williams, D. R. (2005). Stress, life events, and socioeconomic disparities in health: results from the Americans' Changing Lives Study. *Journal of Health and Social Behavior*, *46*(3), 274–288.
- Wallace, D., Wallace, R., & Rauh, V. (2002). Community stress, demoralization, and body mass index: evidence for social signal transduction. *Social Science and Medicine*, *56*, 2467–2478.
- Pearlin, L. I., Schieman, S., Fazio, E. M., & Meersman, S. C. (2005). Stress, health, and life course: some conceptual perspectives. *Journal of Health and Social Behavior*, *46*, 205–219.
- Geronimus, A. T. (1992). The weathering hypothesis and the health of African-American women and infants: evidence and speculations. *Ethnicity and Disease*, *2*, 207–221.
- Williams, D. R. (1997). Race and health: basic questions, emerging directions. *Annals of Epidemiology*, *7*(5), 322–333.
- Marmot, M., & Wilkinson, R. G. (Eds.). (2006). *Social determinants of health* (2nd ed.). New York: Oxford University Press.
- Epel, E. S., Lin, J., Wilhelm, F. H., et al. (2006). Cell aging in relation to stress arousal and cardiovascular disease risk factors. *Psychoneuroendocrinology*, *31*(3), 277–287.
- Dhabhar, F. S. (2000). Acute stress enhances while chronic stress suppresses skin immunity. The role of stress hormones and leukocyte trafficking. *Annals of the New York Academy of Sciences*, *917*, 876–893.
- Bjorntorp, P. (2008). Do stress reactions cause abdominal obesity and comorbidities? *Obesity Review*, *2*, 73–86.
- De Vriendt, T., Moreno, L. A., & De Henauw, S. F. (2009). Chronic stress and obesity in adolescents: scientific evidence and methodological issues for epidemiological research. *Nutrition, Metabolism and Cardiovascular Disease*, *19*(7), 511–519.
- Karlamangla, A. S., Singer, B. H., McEwen, B. S., Rowe, J. W., & Seeman, T. E. (2002). Allostatic load as a predictor of functional decline. MacArthur studies of successful aging. *Journal of Clinical Epidemiology*, *55*(7), 696–710.
- Hammen, C. (2005). Stress and depression. *Annual Review of Clinical Psychology*, *1*, 293–319.
- McEwen, B. S. (2006). Sleep deprivation as a neurobiologic and physiologic stressor: allostasis and allostatic load. *Metabolism*, *55*(Suppl 2), S20–S23.
- Patel, S. R., & Hu, F. B. (2008). Short sleep duration and weight gain: a systematic review. *Obesity*, *16*(3), 643–653.
- Piazza, P. V., & LeMoal, M. L. (1998). The role of stress in drug self-administration. *Trends in Pharmacological Sciences*, *19*, 67–74.
- Benowitz, N. L. (1996). Pharmacology of nicotine: addiction and therapeutics. *Annual Review of Pharmacology and Toxicology*, *36*, 597–613.
- Pecoraro, N., Reyes, F., Gomez, F., Bhargava, A., & Dallman, M. F. (2004). Chronic stress promotes palatable feeding, which reduces signs of stress: feedforward and feedback effects of chronic stress. *Endocrinology*, *145*(8), 3754–3762.
- Dallman, M. F., Pecoraro, N. C., & La Fleur, S. E. (2005). Chronic stress and comfort foods: self-medication and abdominal obesity. *Brain, Behavior, and Immunity*, *19*(4), 275–280.
- Epel, E., Lapidus, R., McEwen, B., & Brownell, K. (2001). Stress may add bite to appetite in women: a laboratory study of stress-induced cortisol and eating behavior. *Psychoneuroendocrinology*, *26*, 37–49.
- Adam, T. C., & Epel, E. S. (2007). Stress, eating and the reward system. *Physiology & Behavior*, *91*(4), 449–458.
- Warne, J. P. (2009). Shaping the stress response: interplay of palatable food choices, glucocorticoids, insulin and abdominal obesity. *Molecular and Cellular Endocrinology*, *300*(1–2), 137–146.
- Jackson, J. S., Knight, K. M., & Rafferty, J. A. (2010). Race and unhealthy behaviors: chronic stress, the HPA Axis, and physical and mental health disparities over the life course. *American Journal of Public Health*, *100*(5), 933–939.
- Fields, S., Leraas, K., Collins, C., & Reynolds, B. (2009). Delay discounting as a mediator of the relationship between perceived

- stress and cigarette smoking status in adolescents. *Behavioural Pharmacology*, 20, 455–460.
39. Baumeister, R. F., Sparks, E. A., Stillman, T. F., & Vohs, K. D. (2008). Free will in consumer behavior: self-control, ego depletion, and choice. *Journal of Consumer Psychology*, 18, 4–13.
40. Link, B. G., & Phelan, J. (1995). Social conditions as fundamental causes of disease. *Journal of Health and Social Behavior*, 35(extra issue), 80–94.
41. Kawachi, I., & Berkman, L. F. (2001). Social ties and mental health. *Journal of Urban Health*, 78(3), 458–467.
42. Brotman, L. M., Dawson-McClure, S., Huang, K. Y., Theise, R., Kamboukos, D., Wang, J., et al. (2012). Early childhood family intervention and long-term obesity prevention among high-risk minority youth. *Pediatrics*, 129(3), e621–e628.
43. Williams, D. R., Lavizzo-Mourey, R., & Warren, R. C. (1994). The concept of race and health status in America. *Public Health Reports*, 109(1), 26–41.