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WHY ZEBRAS DON'T GET ULCERS

Third Edition

ROBERT M. SAPOLSKY



St. Martin's Griffin
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**For Lisa, my best friend,
who has made my life complete**

task. The other consequence is that, after awhile, we even habituate to those artificial deluges of intensity and moment-ness. If we were nothing but machines of local homeostatic regulation, as we consume more, we would desire less. But instead, our tragedy is that we just become hungrier. More and faster and stronger. "Now" isn't as good as it used to be, and won't suffice tomorrow.

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THE VIEW FROM THE BOTTOM



Toward the end of the first chapter, I voiced a caveat—when I discuss a way in which stress can make you sick, that is merely shorthand for discussing how stress can make you more likely to get diseases that make you sick.

That was basically a first pass at a reconciliation between two very different camps that think about poor health. At one extreme, you have the mainstream medical crowd that is concerned with reductive biology. For them, poor health revolves around issues of bacteria, viruses, genetic mutations, and so on. At the other extreme are the folks anchored in mind-body issues, for whom poor health is about psychological stress, lack of control and efficacy, and so on. A lot of this book has, as one of its goals, tried to develop further links between those two viewpoints. This has come in the form of showing how sensitive reductive biology can be to some of those psychological factors, and exploring the mechanisms that account for this. And it has come in the form of criticizing the extremes of both camps: on the one hand, trying to make clear how limiting it is to believe that humans can ever be reduced to a DNA sequence, and on the other, trying to indicate the damaging idiocy of denying the realities of human physiology and disease. The ideal resolution harks back to the wisdom of Herbert Weiner, as discussed in chapter 8, that disease, even the most reductive of diseases, cannot be appreciated without considering the person who is ill.

Terrific; we're finally getting somewhere. But this analysis, and most pages of this book up until now, have left out a third leg in this stool—the idea that poor health also has something to do with poor jobs in a shrinking economy, or a diet funded by food stamps with too

many meals consisting of Coke and Cheetos, or living in a crummy overcrowded apartment close to a toxic waste dump or without enough heat in winter. Let alone living on the streets or in a refugee camp or a war zone. If we can't consider disease outside the context of the person who is ill, we also can't consider it outside the context of the society in which that person has gotten ill, and that person's place in that society.

I recently found support for this view in an unexpected corner. Neuroanatomy is the study of the connections between different areas of the nervous system, and it can sometimes seem like a mind-numbing form of stamp collecting—some multisyllabically named part of the brain sends its axons in a projection with another multisyllabic name to eighteen multisyllabic target sites, whereas in the next county over in the brain. . . . During a period of my errant youth I took particular pleasure in knowing as much neuroanatomy as possible, the more obscure, the better. One of my favorite names was that given to a tiny space that exists between two layers of the meninges, the tough fibrous wrapping found around the brain. It was called the “Virchow-Robin space,” and my ability to toss off that name won me the esteem of my fellow neuroanatomy dorks. I never figured out who Robin was, but Virchow was Rudolph Virchow, a nineteenth-century German pathologist and anatomist. Man, to be honored by having your name attached to some microscopic space between two layers of Saran brain wrap—this guy must have been the king of reductive nuts-and-bolts science to merit that. I'd bet he even wore a monocle, which he'd remove before peering down a microscope.

And then I found out a bit about Rudolph Virchow. As a young physician, he came of age with two shattering events—a massive typhus outbreak in 1847 that he attempted to combat firsthand and the doomed European revolutions of 1848. The first was the perfect case for teaching that disease can be as much about appalling living conditions as it is about microorganisms. The second taught just how effectively the machinery of power can subjugate those in appalling living conditions. In its aftermath, he emerged not just as someone who was a scientist plus a physician plus a public health pioneer plus a progressive politician—that would be plenty unique. But in addition, through a creative synthesis, he saw all those roles as manifestations of a single whole. “Medicine is a social science, and politics nothing but medicine on a large scale,” he wrote. And, “Physicians are the natural attorneys of the poor.” This is an extraordinarily large vision for a man getting microscopic spaces named for him. And unless one happens to be a very atypical physician these days, this vision must also

seem extraordinarily quaint, as sadly quaint as Picasso thinking he could throw some paint on a canvas, call it *Guernica*, and do something to halt Fascism.

The history of status thymicolymphaticus, the imaginary disease of a supposedly enlarged thymus gland in infants, detailed at the end of chapter 8, taught us that your place in society can leave its imprint on the corpse you eventually become. The purpose of this chapter is to show how your place in society, and the sort of society it is, can leave an imprint on patterns of disease while you are alive, and to show that part of understanding this imprint incorporates the notion of stress. This will be preparatory for an important notion to be discussed in the final chapter on stress management—that certain techniques for reducing stress work differently depending on where you dwell in your society's hierarchy.

A strategy that I've employed in a number of chapters is to introduce some phenomenon in the context of animals, often social primates. This has been in order to show some principle in a simplified form before turning to the complexity of humans. I do the same in this chapter, beginning with a discussion of what social rank has to do with health and stress-related diseases among animals. But this time, there is a paradoxical twist that, by the end of this chapter, should seem depressing as hell—this time, it is we humans who provide a brutally simple version and our nonhuman primate cousins the nuance and subtlety.



PECKING ORDERS AMONG BEASTS WITH TAILS

While pecking orders—dominance hierarchies—might have first been discerned among hens, they exist in all sorts of species. Resources, no matter how plentiful, are rarely divvied up evenly. Instead of every contested item being fought for with bloodied tooth and claw, dominance hierarchies emerge. As formalized systems of inequities, these are great substitutes for continual aggression between animals smart enough to know their place.

Hierarchical competition has been taken to heights of animal complexity by primates. Consider baboons, the kind running around savannas in big social groups of a hundred or so beasts. In some cases, the hierarchy can be fluid, with ranks changing all the time; in other cases, rank is hereditary and lifelong. In some cases, rank can depend on the situation—A outranks B when it comes to a contested food item, but the order is reversed if it is competition for someone of the

opposite sex. There can be circularities in hierarchies—A defeats B defeats C defeats A. Ranking can involve coalitional support—B gets trounced by A, unless receiving some well-timed help from C, in which case A is sent packing. The actual confrontation between two animals can include anything ranging from a near fatal brawl to a highly dominant individual doing nothing more than shifting menacingly and giving subordinates the willies.

Regardless of the particulars, if you're going to be a savanna baboon, you probably don't want to be a low-ranking one. You sit there for two minutes digging some root out of the ground to eat, clean it off and . . . anyone higher ranking can rip it off from you. You spend hours sweet-talking someone into grooming you, getting rid of those bothersome thorns and nettles and parasites in your hair, and the grooming session can be broken up by someone dominant just for the sheer pleasure of hassling you. Or you could be sitting there, minding your own business, bird-watching, and some high-ranking guy having a bad day decides to make you pay for it by slashing you with his canines. (Such third-party "displacement aggression" accounts for a huge percentage of baboon violence. A middle-ranking male gets trounced in a fight, turns and chases a subadult male, who lunges at an adult female, who bites a juvenile, who slaps an infant.) For a subordinate animal, life is filled with a disproportionate share not only of physical stressors but of psychological stressors as well—lack of control, of predictability, of outlets for frustration.

It's not surprising, then, that among subordinate male baboons, resting levels of glucocorticoids are significantly higher than among dominant individuals—for a subordinate, everyday basal circumstances are stressful. And that's just the start of subordinates' problems with glucocorticoids. When a real stressor comes along, their glucocorticoid response is smaller and slower than in dominant individuals. And when it's all passed, their recovery appears to be delayed. All these are features that count as an inefficient stress-response.*

More problems for subordinate individuals: elevated resting blood pressure; sluggish cardiovascular response to real stressors; a sluggish

* I spent about a dozen summers with my baboons figuring out the neuroendocrine mechanisms that give rise to the inefficient glucocorticoid system in the subordinate animals. "Neuroendocrine mechanisms" means the steps linking the brain, the pituitary, and the adrenals in the regulation of glucocorticoid release. The question becomes which of the steps—brain, pituitary, adrenals—is the spot where there is a problem. There turn out to be a number of sites where things work differently in subordinate and dominant baboons. Interestingly, the mechanisms that give rise to the pattern in subordinate baboons are virtually identical with those that give rise to the elevated glucocorticoid levels that occur in many humans with major depression.



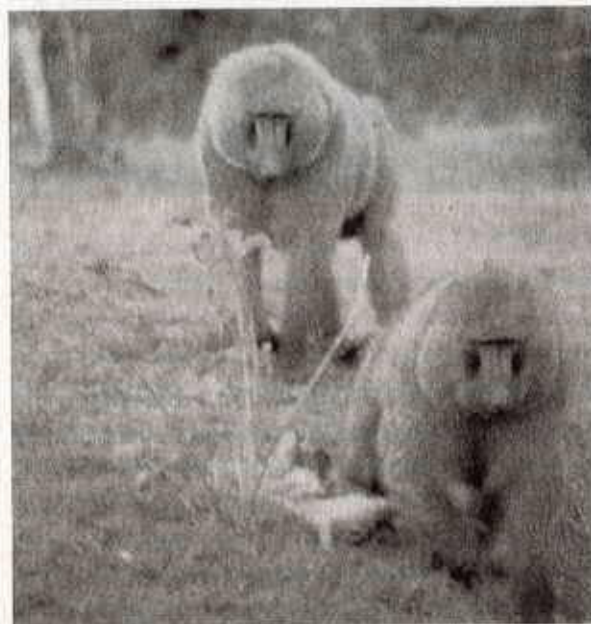
Grooming, a wonderful means of social cohesion and stress reduction, in a society where everyone's back is not scratched equally.

recovery; suppressed levels of the good HDL cholesterol; among male subordinates, testosterone levels that are more easily suppressed by stress than in dominant males; fewer circulating white blood cells; and lower circulating levels of something called *insulin-like growth factor-I*, which helps heal wounds. As should be clear umpteen pages into this book, all these are indices of bodies that are chronically stressed.

A chronically activated stress-response (elevated glucocorticoid levels, or resting blood pressure that is too high, or an enhanced risk of atherosclerosis) appears to be a marker of being low ranking in lots of other animal species as well. This occurs in primates ranging from standard-issue monkeys like rhesus to beasts called prosimians (such as mouse lemurs). Same for rats, mice, hamsters, guinea pigs, wolves, rabbits, pigs. Even fish. Even sugar gliders, whatever they might be.

A critical question: I'm writing as if being low ranking and subject to all those physical and psychological stressors chronically activates the stress-response. Could it be the other way around? Could having a second-rate stress-response set you up for being low ranking?

You can answer this question with studies of captive animals, where you can artificially form a social group. Monitor glucocorticoid levels, blood pressure, and so on when the group is first formed, and again once rankings have emerged, and the comparison will tell you in which direction the causality works—do physiological differences



A middle-ranking baboon, who has spent all morning stalking an impala, has the kill stolen from him by a high-ranking male.

predict who is going to wind up with which rank, or is it the other way around? The answer, overwhelmingly, is that rank emerges first, and drives the distinctive stress profile.

So we've developed a pretty clear picture. Social subordination equals being chronically stressed equals an overactive stress-response equals more stress-related disease. Now it's time to see why that's simplistic and wrong.

The first hint is hardly a subtle one. When you stand up at some scientific meeting and tell about the health-related miseries of your subordinate baboons or tree shrews or sugar gliders, invariably some other endocrinologist who studies the subject in some other species gets up and says, "Well, *my* subordinate animals don't have high blood pressure or elevated glucocorticoid levels." There are lots of species in which social subordination is not associated with an overactive stress-response.

Why should that be? Why should being subordinate not be so bad in that species? The answer is that in that species, it's not so bad being subordinate, or possibly it's actually a drag being dominant.

An example of the first is seen with a South American monkey called the marmoset. Being subordinate among them does not involve the misery of physical and psychological stressors; it isn't a case of subjugation being forcibly imposed on you by big, mean, dominant animals. Instead, it is a relaxed waiting strategy—marmosets live in small social groups of related "cooperative breeders," where being subordinate typically means you are helping out your more dominant older sibling or cousin and waiting your turn to graduate into that role. Commensurate with this picture, David Abbott at the Wisconsin Regional Primate Research Center has shown that subordinate marmosets don't have overactive stress-responses.

Wild dogs and dwarf mongooses provide examples of the second situation in which subordination isn't so bad. Being dominant in those species doesn't mean a life of luxury, effortlessly getting the best of the pickings and occasionally endowing an art museum. None of that status quo stuff. Instead, being dominant requires the constant reassertion of high rank through overt aggression—one is tested again and again. As Scott and Nancy Creel at Montana State University have shown, it's not the subordinate animals among those species who have the elevated basal glucocorticoid levels, it's the dominant ones.

Recently, Abbott and I drew on the collaborative efforts of a large number of colleagues who have studied rank/stress physiology issues in nonhuman primates. We formalized what features of a primate society predict whether it is the dominant or the subordinate animals who

have the elevated stress-responses. To the experts on each primate species, we posed the same questions: in the species that you study, what are the rewards of being dominant? How much of a role does aggression play in maintaining dominance? How much grief does a subordinate individual have to take? What sources of coping and support (including the presence of relatives) do subordinates of that species have available to them? What covert alternatives to competition are available? If subordinates cheat at the rules, how likely are they to get caught and how bad is the punishment? How often does the hierarchy change? Amid seventeen questions asked concerning the dozen different species for which there are decent amounts of data available, the best predictors of elevated glucocorticoid levels among subordinate animals turn out to be if they are frequently harassed by dominant individuals and if they lack the opportunities for social support.

So rank means different things in different species. It turns out that rank can also mean different things in different social groups within the same species. Primatologists these days talk about primate "culture," and this is not an anthropomorphic term. For example, chimps in one part of the rain forest can have a very different culture from the folks four valleys over—different frequencies of social behaviors, use of similar vocalizations but with different meanings (in other words, something approaching the concept of a "dialect"), different types of tool use. And intergroup differences influence the rank-stress relationship.

One example is found among female rhesus monkeys, where subordinates normally take a lot of grief and have elevated basal glucocorticoid levels—except in one social group that was studied, which, for some reason, had high rates of reconciliatory behaviors among animals after fights. The same is found in a baboon troop that just happened to be a relatively benign place to be a low-ranking individual. Another example concerns male baboons where, as noted, subordinates normally have the elevated glucocorticoid levels—except during a severe drought, when the dominant males were so busy looking for food that they didn't have the time or energy to hassle everyone else (implying, ironically, that for a subordinate animal, an environmental stressor can be a blessing, insofar as it saves you from a more severe social stressor).

A critical intergroup difference in the stress-response concerns the stability of the dominance hierarchy. Consider an animal who is, say, Number 10 in the hierarchy. In a stable system, that individual is getting trounced 95 percent of the time by Number 9 but, in turn, thrashes Number 11 95 percent of the time. In contrast, if Number 10 were winning only 51 percent of interactions with Number 11, that suggests

that the two may be close to switching positions. In a stable hierarchy, 95 percent of the interactions up and down the ranks reinforce the status quo. Under those conditions, dominant individuals are stably entrenched and have all the psychological perks of their position—control, predictability, and so on. And under those conditions, among the various primate species discussed above, it is the dominant individuals who have the healthiest stress-responses.

In contrast, there are rare periods when the hierarchy becomes unstable—some key individual has died, someone influential has transferred into the group, some pivotal coalitional partnership has formed or come apart—and a revolution results, with animals changing ranks left and right. Under those conditions, it is typically the dominant individuals who are in the very center of the hurricane of instability, subject to the most fighting, the most challenges, and who are most affected by the see-sawing of coalitional politics.* During such unstable periods among those same primate species, the dominant individuals no longer have the healthiest stress-responses.

So while rank is an important predictor of individual differences in the stress-response, the meaning of that rank, the psychological baggage that accompanies it in a particular society, is at least as important. Another critical variable is an animal's personal experience of both its rank and society. For example, consider a period when an immensely aggressive male has joined a troop of baboons and is raising hell, attacking animals unprovoked left and right. One might predict stress-responses throughout the troop thanks to this destabilizing brute. But, instead, the pattern reflects the individual experience of animals—for those lucky enough never to be attacked by this character, there were no changes in immune function. In contrast, among those attacked, the more frequently that particular baboon suffered at this guy's teeth, the more immunosuppressed she was. Thus, you ask the question, "What are the effects of an aggressive, stressful individual on immune function in a social group?" The answer is, "It depends—it's not the abstract state of living in a stressful society which is immunosuppressive. Instead, it is the concrete state of how often your own nose is being rubbed in that instability."[†]

* After all, do you think it would have been restful to have been the czar of Russia in 1917?

† All you have to do to appreciate that bad times for a group as a whole do not necessarily translate into bad times for every individual is to consider all the people who have made fortunes black-marketing penicillin or hoarding critical food supplies during wartime.

As a final variable, it is not just rank that is an important predictor of the stress-response, not just the society in which the rank occurs, or how a member of the society experiences both; it's also personality—the topic of chapter 15. As we saw, some primates see glasses as half empty and life as full of provocations, and they can't take advantage of outlets or social support—those are the individuals with overactive stress-responses. For them, their rank, their society, their personal experiences might all be wonderfully salutary, but if their personality keeps them from perceiving those advantages, their hormone levels and arteries and immune systems are going to pay a price.

All things considered, this presents a pretty subtle picture of what social rank has to do with stress-related disease among primates. It's reasonable to expect the picture to be that much more complicated and subtle when considering humans. Time for a surprise.



DO HUMANS HAVE RANKS?

I personally was always picked last for the whiffleball team as a kid, being short, uncoordinated, and typically preoccupied with some book I was lugging around. Thus, having been perpetually ensconced at the bottom of that pecking order, I am skeptical about the notion of ranking systems for humans.

Part of the problem is definitional, in that some supposed studies of human "dominance" are actually examining Type-A features—people defined as "dominant" are ones who, in interviews, have hostile, competitive contents to their answers, or who speak quickly and interrupt the interviewer. This is not dominance in a way that any zoologist would endorse.

Other studies have examined the physiological correlates of individual differences in humans who are competing directly against one another in a way that looks like dominance. Some have examined, for example, the hormonal responses in college wrestlers depending on whether they won or lost their match. Others have examined the endocrine correlates of rank competition in the military. One of the most fruitful areas has been to examine ranks in the corporate world. Chapter 13 showed how the "executive stress syndrome" is mostly a myth—people at the top give ulcers, rather than get them. Most studies have shown that it is middle management that succumbs to the stress-related diseases. This is thought to reflect the killer combination

that these folks are often burdened with, namely, high work demands but little autonomy—responsibility without control.

Collectively, these studies have produced some experimentally reliable correlations. I'm just a bit dubious as to what they mean. For starters, I'm not sure what a couple of minutes of competitive wrestling between two highly conditioned twenty-year-olds teaches us about which sixty-year-old gets clogged arteries. At the other end, I wonder what the larger meaning is of rankings among business executives—while primate hierarchies can ultimately indicate how hard you have to work for your calories, corporate hierarchies are ultimately about how hard you have to work for, say, a plasma TV. Another reason for my skepticism is that for 99 percent of human history, societies were most probably strikingly unhierarchical. This is based on the fact that contemporary hunter-gatherer bands are remarkably egalitarian.

But my skepticism is most strongly anchored in two reasons having to do with the complexity of the human psyche. First, humans can belong to a number of different ranking systems simultaneously, and ideally are excelling in at least one of them (and thus, may be giving the greatest psychological weight to that one). So, the lowly subordinate in the mailroom of the big corporation may, after hours, be deriving tremendous prestige and self-esteem from being the deacon of his church, or the captain of her weekend softball team, or may be at the top of the class at the adult-extension school. One person's highly empowering dominance hierarchy may be a mere 9-to-5 irrelevancy to the person in the next cubicle, and this will greatly skew results.

And most important, people put all sorts of spin inside their heads about ranks. Consider a marathon being observed by a Martian scientist studying physiology and rank in humans. The obvious thing to do is keep track of the order in which people finish the race. Runner 1 dominates 5, who clearly dominates 5,000. But what if runner 5,000 is a couch potato who took up running just a few months ago, who half expected to keel over from a coronary by mile 13 and instead finished—sure, hours after the crowds wandered off—but finished, exhausted and glowing. And what if runner 5 had spent the previous week reading in the sports section that someone of their world-class quality should certainly finish in the top three, maybe even blow away the field. No Martian on earth could predict correctly who is going to feel exultantly dominant afterward.

People are as likely to race against themselves, their own previous best time, as against some external yardstick. This can be seen in the corporate world as well. An artificial example: the kid in the mailroom

is doing a fabulous job and is rewarded, implausibly, with a \$50,000 a year salary. A senior vice president screws up big-time and is punished, even more implausibly, with a \$50,001 a year salary. By the perspective of that Martian, or even by a hierarchically minded wildebeest, it's obvious that the vice president is in better shape to acquire the nuts and berries needed for survival. But you can guess who is going to be going to work contentedly and who is going to be making angry phone calls to a headhunter from the cell phone in the BMW. Humans can play internal, rationalizing games with rank based on their knowledge of what determined their placement. Consider the following fascinating example: guys who win at some sort of competitive interaction typically show at least a small rise in their circulating testosterone levels—unless they consider the win to have come from sheer luck.

When you put all those qualifiers together, I think the net result is some pretty shaky ground when it comes to considering human rank and its relevance to the stress-response. Except in one realm. If you want to figure out the human equivalent of being a low-ranking social animal, an equivalent that carries with it atypically high rates of physical and psychological stressors, which is ecologically meaningful in that it's not just about how many hours you have to work to buy an iPod, which is likely to overwhelm most of the rationalizations and alternative hierarchies that one can muster—check out a poor human.



SOCIOECONOMIC STATUS, STRESS, AND DISEASE

If you want to see an example of chronic stress, study poverty. Being poor involves lots of physical stressors. Manual labor and a greater risk of work-related accidents. Maybe even two or three exhausting jobs, complete with chronic sleep deprivation. Maybe walking to work, walking to the laundromat, walking back from the market with the heavy bag of groceries, instead of driving an air-conditioned car. Maybe too little money to afford a new mattress that might help that aching back, or some more hot water in the shower for that arthritic throb; and, of course, maybe some hunger thrown in as well. . . . The list goes on and on.

Naturally, being poor brings disproportionate amounts of psychological stressors as well. Lack of control, lack of predictability: numbing work on an assembly line, an occupational career spent taking orders or going from one temporary stint to the next. The first

one laid off when economic times are bad—and studies show that the deleterious effects of unemployment on health begin not at the time the person is laid off, but when the mere threat of it first occurs. Wondering if the money will stretch to the end of the month. Wondering if the rickety car will get you to tomorrow's job interview on time. How's this for an implication of lack of control: one study of the working poor showed that they were less likely to comply with their doctors' orders to take antihypertensive diuretics (drugs that lower blood pressure by making you urinate) because they weren't allowed to go to the bathroom at work as often as they needed to when taking the drugs.

As a next factor, being poor means that you often can't cope with stressors very efficiently. Because you have no resources in reserve, you can never plan for the future, and can only respond to the present crisis. And when you do, your solutions in the present come with a whopping great price later on—metaphorically, or maybe not so metaphorically, you're always paying the rent with money from a loan shark. Everything has to be reactive, in the moment. Which increases the odds that you'll be in even worse shape to deal with the next stressor—growing strong from adversity is mostly a luxury for those who are better off.

Along with all of that stress and reduced means of coping, poverty brings with it a marked lack of outlets. Feeling a little stressed with life and considering a relaxing vacation, buying an exercycle, or taking some classical guitar lessons to get a little peace of mind? Probably not. Or how about quitting that stressful job and taking some time off at home to figure out what you're doing with your life? Not when there's an extended family counting on your paycheck and no money in the bank. Feeling like at least jogging regularly to get some exercise and let off some steam? Statistically, a poor person is far more likely to live in a crime-riddled neighborhood, and jogging may wind up being a hair-raising stressor.

Finally, along with long hours of work and kids to take care of comes a serious lack of social support—if everyone you know is working two or three jobs, you and your loved ones, despite the best of intentions, aren't going to be having much time to sit around being supportive. Thus, poverty generally equals more stressors—and though the studies are mixed as to whether or not the poor have more major catastrophic stressors, they have plenty more chronic daily stressors.

All these hardships suggest that low socioeconomic status (SES—typically measured by a combination of income, occupation, housing

conditions, and education) should be associated with chronic activation of the stress-response. Only a few studies have looked at this, but they support this view. One concerned school kids in Montreal, a city with fairly stable communities and low crime. In six- and eight-year-old children, there was already a tendency for lower-SES kids to have elevated glucocorticoid levels. By age ten, there was a step-wise gradient, with low-SES kids averaging almost double the circulating glucocorticoids as the highest SES kids. Another example concerns people in Lithuania. In 1978, men in Lithuania, then part of the USSR, had the same mortality rates for coronary heart disease as did men in nearby Sweden. By 1994, following the disintegration of the Soviet Union, Lithuanians had four times the Swedish rate. In 1994 Sweden, SES was not related to glucocorticoid levels, whereas in 1994 Lithuania, it was strongly related.

Findings like these suggest that being poor is associated with more stress-related diseases. As a first pass, let's just ask whether low SES is associated with more diseases, period. And is it ever.

The health risk of poverty turns out to be a huge effect, the biggest risk factor there is in all of behavioral medicine—in other words, if you have a bunch of people of the same gender, age, and ethnicity and you want to make some predictions about who is going to live how long, the single most useful fact to know is each person's SES. If you want to increase the odds of living a long and healthy life, don't be poor. Poverty is associated with increased risks of cardiovascular disease, respiratory disease, ulcers, rheumatoid disorders, psychiatric diseases, and a number of types of cancer, just to name a few.* It is associated with higher rates of people judging themselves to be of poor health, of infant mortality, and of mortality due to all causes. Moreover, lower SES predicts lower birth weight, after controlling for body size—and we know from chapter 6 the lifelong effects of low birth weight. In other words, be born poor but hit the lottery when you're three weeks

* As but one example, across the countries of Europe, socioeconomic status accounts for 68 percent of the variance as to who gets a stroke. However, not all diseases are more prevalent among the poor, and, fascinatingly, some are even more common among the wealthy. Melanoma is an example, suggesting that sun exposure in a lounge chair may have different disease risks than getting your neck red from stooped physical labor (or that a huge percentage of poor people laboring away in the sun have a fair amount of melanin in their skin, if you know what I mean). Or multiple sclerosis, and a few other autoimmune diseases and, during its heyday, polio. Or "hospitalism," a pediatric disease of the 1930s in which infants would waste away in hospitals. It is now understood that it was mostly due to lack of contact and sociality—and kids who would wind up in poorer hospitals were less subject to this, since the hospitals couldn't afford state-of-the-art incubators, necessitating that staff actually hold them.

old, spend the rest of your life double-dating with Donald Trump, and you're still going to have a statistical increase in some realms of disease risk for the rest of your life.

Is the relationship between SES and health just some little statistical hiccup in the data? No—it can be a huge effect. In the case of some of those diseases sensitive to SES, if you cling to the lowest rungs of the socioeconomic ladder, it can mean ten times the prevalence compared with those perched on top.* Or stated another way, this translates into a five- to ten-year difference in life expectancy in some countries when comparing the poorest and wealthiest, and decades' worth of differences when comparing subgroups of the poorest and wealthiest.

Findings such as these go back centuries. For example, one study of men in England and Wales demonstrated a steep SES gradient in mortality in every decade of the twentieth century. This has a critical implication that has been pointed out by Robert Evans of the University of British Columbia: the diseases that people were dying of most frequently a century ago are dramatically different from the most common ones now. Different causes of death, but same SES gradient, same relationship between SES and health. Which tells you that the gradient arises less from disease than from social class. Thus, writes Evans, the "roots [of the SES health gradient] lie beyond the reach of medical therapy."

So SES and health are tightly linked. What direction is the causality? Maybe being poor sets you up for poor health. But maybe it's the other way around, where being sickly sets you up for spiraling down into poverty. The latter certainly happens, but most of the relationship is due to the former. This is demonstrated by showing that your SES at one point in life predicts important features of your health later on. For example, poverty early in life has adverse effects on health forever after—harking back to chapter 6 and the fetal origins of adult disease. One remarkable study involved a group of elderly nuns. They took their vows as young adults, and spent the rest of their lives sharing the same diet, same health care, same housing, and so on. Despite controlling for all these variables, in old age their patterns of disease, of dementia, and of longevity were still predicted by the SES status they had when they became nuns more than half a century before.

Thus, SES influences health, and the greater cumulative percentage of your life you've spent poor, the more of an adverse impact on

* A number of writers in the field have noted (even pre-DiCaprio) that there was a strict SES gradient as to who survived on the *Titanic*.

health.* Why should SES influence health? A century ago in the United States, or today in a developing country, the answer would be obvious. It would be about poor people getting more infectious diseases, less food, and having an astronomically higher infant mortality rate. But with our shift toward the modern prevalence of slow, degenerative diseases, the answers have shifted as well.



THE PUZZLE OF HEALTH CARE ACCESS

Let's start with the most plausible explanation. In the United States, poor people (with or without health insurance) don't have the same access to medical care as do the wealthy. This includes fewer preventive check-ups with doctors, a longer lag time for testing when something bothersome has been noted, and less adequate care when something has actually been discovered, especially if the medical care involves an expensive, fancy technique. As one example of this, a 1967 study showed that the poorer you are judged to be (based on the neighborhood you live in, your home, your appearance), the less likely paramedics are to try to revive you on the way to the hospital. In more recent studies, for the same severity of a stroke, SES influenced your likelihood of receiving physical, occupational, or speech therapy, and how long you waited until undergoing surgery to repair the damaged blood vessel that caused the stroke.

This sure seems like it should explain the SES gradient. Make the health care system equitable, socialize that medicine, and away would go that gradient. But it can't be only about differential health care access, or even mostly about it.

For starters, consider countries in which poverty is robustly associated with increased prevalence of disease: Australia, Belgium, Denmark, Finland, France, Italy, Japan, the Netherlands, New Zealand, the former Soviet Union, Spain, Sweden, the United Kingdom, and, of course, the U.S. of A. Socialize the medical care system, socialize the whole country, turn it into a worker's paradise, and you still get the gradient. In a place like England, the SES gradient has gotten worse over this century, despite the imposition of universal health care allowing everyone equal health care access.

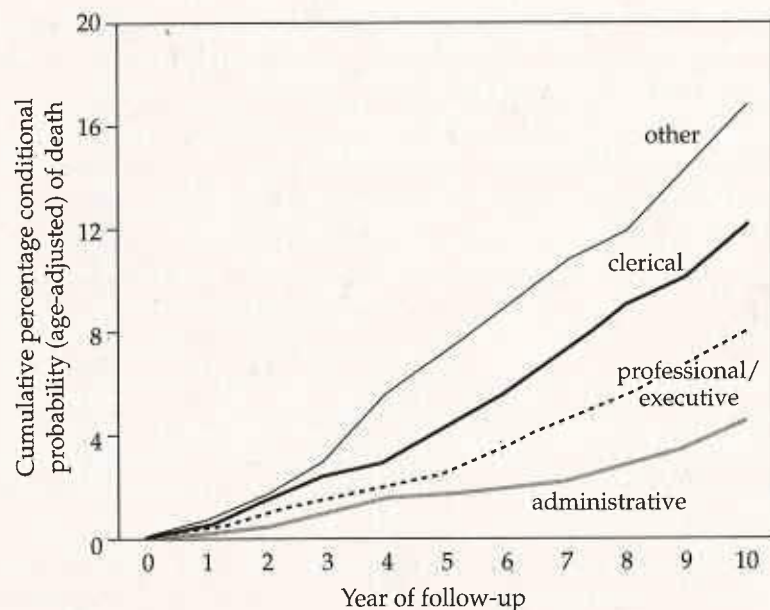
* What that means is that you're not completely sunk if you're born poor; social mobility helps to some extent.

You could cynically and correctly point out that systems of wonderfully egalitarian health care access are probably egalitarian in theory only—even the Swedish health care system is likely to be at least a smidgen more attentive to the wealthy industrialist, sick doctor, or famous jock than to some no-account poor person cluttering up a clinic. Some people always get more of their share of equality than others. But in at least one study of people enrolled in a prepaid health plan, where medical facilities were available to all participants, poorer people had more cardiovascular disease, despite making more use of the medical resources.

A second vote against the importance of differential health care access is because the relationship forms the term I've been using, namely, a *gradient*. It's not the case that only poor people are less healthy than everyone else. Instead, for every step lower in the SES ladder, there is worse health (and the lower you get in the SES hierarchy, the bigger is each step of worsening health). This was a point made screamingly clear in the most celebrated study in the field, the Whitehall studies of Michael Marmot of University College of London. Marmot considered a system where gradations in SES status are so clear that occupational rank practically comes stamped on people's foreheads—the British civil service system, which ranges from unskilled blue-collar workers to high-powered executives. Compare the highest and lowest rungs and there's a fourfold difference in rates of cardiac disease mortality. Remember, this is in a system where everyone has roughly equal health care access, is paid a living wage, and, very important in the context of the effects of unpredictability, is highly likely to continue to be able to earn that living wage.

A final vote against the health care access argument: the gradient exists for diseases that have nothing to do with access. Take a young person and, each day, scrupulously, give her a good medical examination, check her vitals, peruse her blood, run her on a treadmill, give her a stern lecture about good health habits, and then, for good measure, centrifuge her a bit, and she is still just as much at risk for some diseases as if she hadn't gotten all that attention. Poor people are still more likely to get those access-proof diseases. Theodore Pincus of Vanderbilt University has carefully documented the existence of an SES gradient for two of those diseases, juvenile diabetes and rheumatoid arthritis.

Thus, the leading figures in this field all seem to rule out health care access as a major part of the story. This is not to rule it out completely (let alone suggest that we not bother trying to establish universal



The Whitehall Study, Mortality by Professional Level of Follow-up.

health care access). As evidence, sweaty capitalist America has the worst gradient, while the socialized Scandinavian countries have the weakest. But they still have hefty gradients, despite their socialism. The main cause has to be somewhere else. Thus, we move on to the next most plausible explanation.



RISK FACTORS AND PROTECTIVE FACTORS

Poorer people in westernized societies are more likely to drink and smoke excessively (sufficiently so that it's been remarked that smoking is soon going to be almost exclusively a low-SES activity). These excesses take us back to the last chapter and having trouble "just saying no" when there are few yes's. Moreover, the poor are more likely to have an unhealthy diet—in the developing world, being poor means having trouble affording food, while in the westernized world, it means having trouble affording *healthy* food. Thanks to industrialization, fewer jobs in our society involve physical exertion and, when combined with the costs of membership in some tony health club, the poor get less exercise. They're more likely to be obese, and in an appleish way. They are less likely to use a seat belt, wear a motorcycle helmet, own a car with air bags. They are more likely to live near a toxic

dump, be mugged, have inadequate heat in the winter, live in crowded conditions (thereby increasing exposure to infectious diseases). The list seems endless, and they all adversely impact health.

Being poor is statistically likely to come with another risk factor—being poorly educated. Thus, maybe poor people don't understand, don't know about the risk factors they are being exposed to, or the health-promoting factors they are lacking—even if it is within their power to do something, they aren't informed. As one example that boggles me, substantial numbers of people are apparently not aware that cigarettes do bad things to you, and the studies show that these aren't folks too busy working on their doctoral dissertations to note some public health trivia. Other studies indicate that, for example, poor women are the least likely to know of the need for Pap smears, thus increasing their risk for cervical cancer.* The intertwining of poverty and poor education probably explains the high rates of poor people who, despite their poverty, could still be eating somewhat more healthfully, using seat belts or crash helmets, and so on, but don't. And it probably helps to explain why poor people are less likely to comply with some treatment regime prescribed for them that they can actually afford—they are less likely to have understood the instructions or to think that following them is important. Moreover, a high degree of education generalizes to better problem-solving skills across the board. Statistically, being better educated predicts that your community of friends and relatives is better educated as well, with those attendant advantages.

However, the SES gradient isn't much about risk factors and protective factors. To show this requires some powerful statistical techniques in which you see if an effect still exists after you control for one or more of these factors. For example, the lower your SES, the greater your risk of lung cancer. But the lower your SES, the greater the likelihood of smoking. So control for smoking—comparing only people who smoke—does the incidence of lung cancer still increase with declining SES? Take it one step further—for the same *amount* of smoking, does lung cancer incidence still increase? For the same amount of smoking *and* drinking, does . . . and so on. These types of analyses show that these risk factors matter—as Robert Evans has written, "Drinking sewage is probably unwise even for Bill Gates." They just

* In a subtle but striking complication to this story, education actually worsens health inequality. As medical research generates new advances in health care and preventive medicine, it is the educated who first hear about it, appreciate it, and adopt it, and thus differentially benefit from it, amplifying the health gradient even more.

don't matter that much. For example, in the Whitehall studies, smoking, cholesterol levels, blood pressure, and level of exercise explain away only about a third of the SES gradient. For the same risk factors and same lack of protective factors, throw in poverty and you're more likely to get sick.

So differential exposure to risk factors or protective factors does not explain a whole lot. This point is brought home in another way. Compare countries that differ in wealth. One can assume that being in a wealthier country gives you more opportunities to buy protective factors and to avoid risk factors. For example, you find the least pollution in very poor and very wealthy countries; the former because they are nonindustrial and the latter because they either do it cleanly or farm it out to someone else. Yet, when you consider the wealthiest quarter or so countries on earth, there is no relationship between a country's wealth and the health of its citizens.* This is a point heavily emphasized by Stephen Bezruchka of the University of Washington, in considering the United States—despite the most expensive and sophisticated health care system in the world, there's an unconscionable number of less wealthy nations whose citizens live longer, healthier lives than our own.†

So out go major roles for health care access, and risk factors. This is where things get tense at the scientific conferences. Much of this book has been about how a certain style of "mainstream" medicine, overly focused on how disease is exclusively about viruses, bacteria, and mutations, has grudgingly had to make room for the relevance of psychological factors, including stress. In a similar way, among the "social epidemiologists" who think about the SES/health gradients, the mainstream view has long focused on health care access and risk factors. And thus, they too have had to make room for psychological factors. Including stress. Big-time.

* This may seem like an aside, but is as central a point as any in this book. Once you get past the 25 percent poorest countries on earth, there's no relationship between the wealth of a country and the percentage of its citizens who say they are happy. (How many countries were on the list whose citizens are at least as happy, if not happier, than Americans, despite being in less wealthy countries? Ten, most with social welfare systems. And unhappiness? The dozen most unhappy are all ex-states of the Soviet Union, or of Eastern Europe.)

† In 1960, the United States was 13th in life expectancy, pretty lousy in and of itself. By 1997, it was 25th. As one example, Greeks, who have approximately half the average income of Americans, have a longer life expectancy.



STRESS AND THE SES GRADIENT

As discussed, the poor certainly have a hugely disproportionate share of both daily and major stressors. If you've gotten this far into this book and aren't wondering whether stress has something to do with the SES health gradient, you should get your money back. Does it?

In the last edition of this book, I argued for a major role for stress based on three points. First, the poor have all those chronic daily stressors. Second, when one examines the SES gradient for individual diseases, the strongest gradients occur for diseases with the greatest sensitivity to stress, such as heart disease, diabetes, Metabolic syndrome, and psychiatric disorders. Finally, once you've rounded up the usual suspects—health care access and risk factors—and ruled them out as being of prime importance, what else is there to pin the SES gradient on? Sunspots?

Kinda flimsy. With that sort of evidence, the social epidemiologists were willing to let in some of those psychologists and stress physiologists, but through the back door, and—Cook, find them something to eat in the *kitchen*, if you please.

So that was the stress argument a half decade back. But since then, striking new findings make the stress argument very solid.



BEING POOR VERSUS FEELING POOR

A central concept of this book is that stress is heavily rooted in psychology once you are dealing with organisms who aren't being chased by predators, and who have adequate shelter and sufficient calories to sustain good health. Once those basic needs are met, it is an inevitable fact that if everyone is poor, and I mean everyone, then no one is. In order to understand why stress and psychological factors have so much to do with the SES/health gradient, we have to begin with the obvious fact that it is never the case that everyone is poor thereby making no one poor. This brings us to a critical point in this field—the SES/health gradient is not really about a distribution that bottoms out at being poor. It's not about being poor. It's about *feeling* poor, which is to say, it's about feeling *poorer* than others around you.

Beautiful work regarding this has been carried out by Nancy Adler of the University of California at San Francisco. Instead of just looking at the relationship between SES and health, Adler looks at what health

has to do with what someone *thinks and feels* their SES is—their “subjective SES.” Show someone a ladder with ten rungs on it and ask them, “In society, where on this ladder would you rank yourself in terms of how well you’re doing?” Simple.

First off, if people were purely accurate and rational, the answers across a group should average out to the middle of the ladder’s rungs. But cultural distortions come in—expansive, self-congratulatory European-Americans average out at higher than the middle rung (what Adler calls her Lake Wobegon Effect, where all the children are above average); in contrast, Chinese-Americans, from a culture with less chest-thumping individualism, average out to below the middle rung. So you have to correct for those biases. In addition, given that you’re asking how people feel about something, you need to control for people who have an illness of feeling, namely depression.

Once you’ve done that, look at what health measures have to do with one’s subjective SES. Amazingly, it is at least as good a predictor of these health measures as is one’s actual SES, and, in some cases, *it is even better*. Cardiovascular measures, metabolism measures, glucocorticoid levels, obesity in kids. *Feeling poor* in our socioeconomic world predicts poor health.

This really isn’t all that surprising. We can be an immensely competitive, covetous, invidious species, and not particularly rational in how we make those comparisons. Here’s an example from a realm unrelated to this subject—show a bunch of women volunteers a series of pictures of attractive female models and, afterward, they feel in a worse mood, with lower self-esteem, than before seeing the pictures (and even more depressingly, show those same pictures to men and afterward what declines is their stated satisfaction with their wives).

So it’s not about being poor. It’s about feeling poor. What’s the difference? Adler shows that subjective SES is built around education, income, and occupational position (in other words, the building blocks of subjective SES), plus satisfaction with standard of living and feeling of financial security about the future. Those last two measures are critical. Income may tell you something (but certainly not everything) about SES; satisfaction with standard of living is the world of people who are poor and happy and zillionaires who are still grasping for more. All that messy stuff that dominates this book. And what is “feelings about financial security” tapping into? Anxiety. So SES reality plus your satisfaction with that SES plus your confidence about how predictable your SES is are collectively better predictors of health than SES alone.

This is not a hard and fast rule, and Adler’s most recent work shows that subjective SES is not necessarily that great of a predictor in **certain ethnic groups—stay tuned for more, no doubt. But overall, this strikes me as immensely impressive—when you’re past the realm of worrying about having adequate shelter and food, being poor is not as bad for you as feeling poor.**



POVERTY VERSUS POVERTY AMID PLENTY

In many ways, an even more accurate tag line for this whole phenomenon is, It’s about being *made* to feel poor. This point is made clearer when considering the second body of research in this area, championed by Richard Wilkinson of the University of Nottingham in England. Wilkinson took a top-down approach, looking at the “How are you doing?” ladder from the societal level.

Let’s consider how answers to “How are you doing?” can be distributed along the ladder. Suppose there is a business with ten employees. Each earns \$5.50 an hour. Thus the company is paying out a total of \$55/hour in salary, and the average income is \$5.50/hour. With that distribution, the wealthiest employee is making \$5.50/hour, or 10 percent of the total income (\$5.50/\$55).

Meanwhile, in the next business, there are also ten employees. One earns \$1/hour, the next \$2/hour, the next \$3, and so on. Once again, the company pays a total of \$55/hour in salary, and the average salary is again \$5.50/hour. But now the wealthiest employee, earning \$10/hour, takes home 18 percent of the total income (\$10/\$55).

Now, in the third company, nine of the employees earn \$1/hour, and the tenth earns \$46/hour. Again, the company pays a total of \$55/hour, and the average salary is \$5.50/hour. And here, the wealthiest employee takes home 84 percent of the total income (\$46/\$55).

What we have here are businesses of increasingly unequal incomes. What Wilkinson and others have shown is that poverty is not only a predictor of poor health but, independent of absolute income, so is poverty amid plenty—the more income inequality there is in a society, the worse the health and mortality rates.

This has been shown repeatedly, and at multiple levels. For example, income inequality predicts higher infant mortality rates across a bunch of European countries. Income inequality predicts mortality rates across all ages (except the elderly) in the United States,

whether you consider this at the level of states or cities. In a world of science often filled with wishy-washy data, the effect is extremely reliable—income inequality across American states is a really strong predictor of mortality rates among working men. When you compare the most egalitarian state, New Hampshire, with the least egalitarian, Louisiana, the latter has about a 60 percent higher mortality rate.* Finally, Canada is both markedly more egalitarian and healthier than the United States—despite being a “poorer” country.

Amid extraordinary findings like that, the relationship between income inequality and poor health doesn’t seem to be universal. Note how flat the curve is for Canada—moreover, you don’t find it when considering adults throughout Western Europe, particularly in countries with well-established social welfare systems like Denmark. In other words, you probably can’t pick up this effect when comparing individual parishes in Copenhagen because the overall pattern is so egalitarian in a place like that. But it’s a reasonably robust relationship in the United Kingdom, while the flagship for the health/income inequality relationship is the United States, where the top 1 percent of the SES ladder controls nearly 40 percent of the wealth, and it’s a huge effect (and persists even after controlling for race).

These studies of nations, states, and cities raise the issue of whom someone is comparing themselves to when they think of where they are on a how-are-you-doing ladder. Adler tries to get at this by asking her question twice. First, you’re asked to place yourself on the ladder with respect to “society as a whole,” and second, with respect to “your immediate community.” The top-down Wilkinson types get at this by comparing the predictive power of data at the national, state, and city levels. Neither literature has given a clear answer yet, but both seem to suggest that it is one’s immediate community that is most important. As Tip O’Neil, the consummate politician, used to say, “All politics is local.”

This is obviously the case in traditional settings where all people know about is the immediate community of their village—look at how many chickens *he* has, I’m *such* a loser. But thanks to urbanization, mobility, and the media that makes for a global village, something absolutely unprecedented can now occur—we can now be made to feel poor, or poorly about ourselves, by people *we don’t even know*. You can feel impoverished by the clothes of someone you pass in a midtown crowd, by the unseen driver of a new car on the freeway, by

* The most egalitarian states tend to be in New England, prairie states like the Dakotas or Iowa, and Utah; the least egalitarian are in the Deep South, plus Nevada.

Bill Gates on the evening news, even by a fictional character in a movie. Our perceived SES may arise mostly out of our local community, but our modern world makes it possible to have our noses rubbed in it by a local community that stretches around the globe.

Income inequality seems really important for making sense of the SES/health gradient. But maybe it isn’t that important. Maybe the inequality business is just a red herring built around the fact that places with big inequalities tend to be poor places as well (in other words, back to the key thing being “poverty,” instead of “poverty amid plenty”). But, control for absolute income, and the inequality data still stand.

There’s a second potential problem (WARNING: skip this paragraph if you’re math-phobic—as a synopsis of the plot, the income inequality hypothesis is menaced by math villains but is saved in a cliffhanger finish). Moving up the SES ladder is associated with better health (by whatever measure you are using) but, as noted, each incremental step gets smaller. A mathematical way of stating this is that the SES/health relationship forms an asymptote—going from very poor to lower middle class involves a steep rise in health that then tends to flatten out as you go into the upper SES range. So if you examine wealthy nations, you are examining countries where SES averages out to somewhere in the flat part of the curve. Therefore, compare two equally wealthy nations (that is to say, which have the same average SES on the flat part of the curve) that differ in income inequality. By definition, the nation with the greater inequality will have more data points coming from the steeply declining part of the curve, and thus must have a lower average level of health. In this scenario, the income inequality phenomenon doesn’t really reflect some feature of society as a whole, but merely emerges, as a mathematical inevitability, from individual data points. However, some fairly fancy mathematical modeling studies show that this artifact can’t explain all of the health-income inequality relationship in the United States.

But, alas, there might be a third problem. Suppose in some society the poor health of the poor was more sensitive to socioeconomic factors than the good health of the rich. Now suppose you make income distribution in that society more equitable by transferring some wealth from the wealthy to the poor.* Maybe by doing that, you make the health of the wealthy a little worse, and the health of the poor a lot

* Appropriately, the proportion of the society’s wealth that must be transferred in order to make for completely equal income is termed the Robin Hood index.

to mean poor health, poor self-reported health, and high mortality rates.*

Findings such as these make perfect sense to Wilkinson. In his writing, he emphasizes that trust requires reciprocity, and reciprocity requires equality. In contrast, hierarchy is about domination, not symmetry and equality. By definition, you can't have a society with both dramatic income inequality and lots of social capital. These findings would also have made sense to the late Aaron Antonovsky, who was one of the first to study the SES/health gradient. He stressed how damaging it is to health and psyche to be an invisible member of society. To recognize the extent to which the poor exist without feedback, just consider the varied ways that most of us have developed for looking through homeless people as we walk past them.

So income inequality, minimal trust, lack of social cohesion all go together. Which causes which, and which is most predictive of poor health? To figure this out, you need some fancy statistical techniques called path analysis. An example we're comfortable with by now from earlier chapters: chronic stress makes for more heart disease. Stress can do this by directly increasing blood pressure. But stress also makes lots of people eat less healthfully. How much is the path from stress to heart disease directly via blood pressure, and how much by the indirect route of changing diet? That's the sort of thing that a path analysis can tell you. And Kawachi's work shows that the strongest route from income inequality (after controlling for absolute income) to poor health is via the social capital measures.

How does lots of social capital turn into better health throughout a community? Less social isolation. More rapid diffusion of health information. Potentially, social constraints on publicly unhealthy behaviors. Less psychological stress. Better organized groups demanding better public services (and, related to that, another great measure of social capital is how many people in a community bother to vote).

So it sounds like a solution to life's ills, including some stress-related ills, is to get into a community with lots of social capital. However, as will be touched on in the next chapter, this isn't always a great thing. Sometimes, communities get tremendous amounts of social capital by having all of their members goose-step to the same thoughts and beliefs and behaviors, and don't cotton much to anyone different.

* Even at the level of college campuses—the more social capital on a campus, by these measures, the less binge drinking.

better. A little worse in the few wealthy plus a lot better in the numerous poor and, overall, you've got a healthier society. That wouldn't be very interesting in the context of stress and psychological factors. But Wilkinson makes an extraordinary point—in societies that have more income equality, both the poor *and the wealthy* are healthier than their counterparts in a less equal society with the same average income. There is something more profound happening here.



HOW DOES INCOME INEQUALITY AND FEELING POOR TRANSLATE INTO BAD HEALTH?

Income inequality and feeling poor could give rise to bad health through a number of routes. One, pioneered by Ichiro Kawachi of Harvard University, focuses on how income inequality makes for a psychologically crappier, more stressful life for everyone. He draws heavily upon a concept in sociology called "social capital." While "financial capital" says something about the depth and range of financial resources you can draw on in troubled times, social capital refers to the same in the social realm. By definition, social capital occurs at the level of a community, rather than at the level of individuals or individual social networks.

What makes for social capital? A community in which there is a lot of volunteerism and numerous organizations that people can join which make them feel like they're part of something bigger than themselves. Where people don't lock their doors. Where people in the community would stop kids from vandalizing a car even if they don't know whose car it is. Where kids don't try to vandalize cars. What Kawachi shows is that the more income inequality in a society, the lower the social capital, and the lower the social capital, the worse the health.

Obviously, "social capital" can be measured in a lot of ways and is still evolving as a hard-nosed measure, but, broadly, it incorporates elements of trust, reciprocity, lack of hostility, heavy participation in organizations for a common good (ranging from achieving fun—a bowling league—to more serious things—tenant organizations or a union) and those organizations accomplishing something. Most studies get at it with two measures: how people answer a question like, "Do you think most people would try to take advantage of you if they got a chance, or would they try to be fair?" and how many organizations people belong to. Measures like those tell you that on the levels of states, provinces, cities, and neighborhoods, low social capital tends

Research by Kawachi and others shows another feature of income inequality that translates into more physical and psychological stress: the more economically unequal a society, the more crime—assault, robbery, and, particularly, homicide—and the more gun ownership. Critically, income inequality is consistently a better predictor of crime than poverty per se. This has been demonstrated on the level of states, provinces, cities, neighborhoods, even individual city blocks. And just as we saw in chapter 13 when we looked at the prevalence of displacement aggression, poverty amid plenty predicts more crime—but not against the wealthy. The have-nots turn upon the have-nots.

Meanwhile, Robert Evans (University of British Columbia), John Lynch, and George Kaplan (the latter two both of the University of Michigan) offer another route linking income inequality to poor health, once again via stress. This pathway is one that, once you grasp it, is so demoralizing that you immediately want to man the barricades and sing revolutionary songs from *Les Miz*. It goes as follows:

If you want to improve health and quality of life, and decrease the stress, for the average person in a society, you do so by spending money on public goods—better public transit, safer streets, cleaner water, better public schools, universal health care. The bigger the income inequality is in a society, the greater the financial distance between the wealthy and the average. The bigger the distance between the wealthy and the average, the less benefit the wealthy will feel from expenditures on the public good. Instead, they would derive much more benefit by spending the same (taxed) money on their private good—a better chauffeur, a gated community, bottled water, private schools, private health insurance. As Evans writes, “The more unequal are incomes in a society, the more pronounced will be the disadvantages to its better-off members from public expenditure, and the more resources will those members have [available to them] to mount effective political opposition.” He notes how this “secession of the wealthy” pushes toward “private affluence and public squalor.” And more public squalor means more of the daily stressors and allostatic load that drives down health for everyone. For the wealthy, this is because of the costs of walling themselves off from the rest of society, and for the rest of society, this is because they have to live in it.

So this is a route by which an unequal society makes for a more stressful reality. But this route certainly makes for more psychological stress as well—if the skew in society biases the increasingly wealthy toward wanting to avoid the public expenditures that would improve everyone else’s quality of life . . . well, that might have some bad effects on trust, hostility, crime, and so on.

So we’ve got income inequality, low social cohesion and social capital, class tensions, and lots of crime all forming an unhealthy cluster. Let’s see a grim example of how these pieces come together. By the late 1980s, life expectancy in Eastern Bloc countries was less than in every Western European country. As analyzed by Evans, these were societies in which there was a fair equity of income distribution, but a highly unequal distribution of freedoms of movement, speech, practice of beliefs, and so on. And what has happened to Russia since the dissolution of the Soviet Union? A massive increase in income inequality and crime, a decline in absolute wealth—and an overall decline in life expectancy that is unprecedented in an industrialized society.

One more grim example of how this works. America: enormous wealth, enormous income inequality, high crime, the most heavily armed nation on earth. And markedly low levels of social capital—it is virtually the constitutional right of an American to be mobile and anonymous. Show your independence. Move across the country for any job opportunity. (He lives across the street from his parents? Isn’t that a little, er, stunted?) Get a new accent, get a new culture, get a new name, unlist your phone number, reboot your life. All of which are the antitheses of developing social capital. This helps to explain something subtle about the health-income inequality relationship. Compare the United States and Canada. As shown, the former has more income inequality and worse health. But restrict your analysis to a subset of atypical American systems chosen to match the low inequality of Canada—and those U.S. cities *still* have worse health and a steeper SES/health gradient. Some detailed analyses show what this is about: it’s not just that America is a markedly unequal society when it comes to income. It’s that even for the same degree of worsening income inequality, social capital is driven down further in the United States.

Our American credo is that people are willing to tolerate a society with miserably low levels of social capital, so long as there can be massive income inequality . . . with the hope that they will soon be sitting at the top of this steep pyramid. Over the last quarter-century, poverty and income inequality have steadily risen, and every social capital measure of trust, community participation, and voter participation has declined.* And what about American health? We have disparity

* The political scientist Robert Putnam of Harvard coined his famous metaphor for this spreading American anomie: “bowling alone.” In recent decades, an increasing number of Americans bowl, but there are fewer people participating in that quintessential American social phenomenon, bowling leagues.

between the wealth of our nation and the health of our citizens that is also unprecedented. And getting worse.

This is pretty depressing stuff, given its implications. Adler, writing around the time when universal health insurance first became a front-page issue (as was the question of whether Hillary's hairstyle made her a more or less effective advocate for it), concluded that such universal coverage would "have a minor impact on SES-related inequalities in health." Her conclusion is anything but reactionary. Instead, it says that if you want to change the SES gradient, it's going to take something a whole lot bigger than rigging up insurance so that everyone can drop in regularly on a friendly small-town doc out of Norman Rockwell. Poverty, and the poor health of the poor, is about much more than simply not having enough money.* It's about the stressors caused in a society that tolerates leaving so many of its members so far behind.

This is relevant to an even larger depressing thought. I initially reviewed what social rank has to do with health in nonhuman primates. Do low-ranking monkeys have a disproportionate share of disease, more stress-related disease? And the answer was, "Well, it's actually not that simple." It depends on the sort of society the animal lives in, its personal experience of that society, its coping skills, its personality, the availability of social support. Change some of those variables and the rank/health gradient can shift in the exact opposite direction. This is the sort of finding that primatologists revel in—look how complicated and subtle my animals are.

The second half of this chapter looked at humans. Do poor humans have a disproportionate share of disease? The answer was "Yes, yes, over and over." Regardless of gender or age or race. In societies with universal health care and those without. In societies that are ethnically homogenous and those rife with ethnic tensions. In societies in which illiteracy is widespread and those in which it has been virtually banished. In those in which infant mortality has been plummeting and in some wealthy, industrialized societies in which rates have inexcusably been climbing. And in societies in which the central mythology is a capitalist credo of "Living well is the best revenge" and those in which it is a socialist anthem of "From each according to his ability, to each according to his needs."

What does this dichotomy between our animal cousins and us signify? The primate relationship is nuanced and filled with qualifiers;

* Evans makes this point by noting, "Most graduate students have had the experience of having very little money, but not of poverty. They are very different things."

the human relationship is a sledgehammer that obliterates every societal difference. Are we humans actually less complicated and sophisticated than nonhuman primates? Not even the most chauvinistic primatologists holding out for their beasts would vote for that conclusion. I think it suggests something else. Agriculture is a fairly recent human invention, and in many ways it was one of the great stupid moves of all time. Hunter-gatherers have thousands of wild sources of food to subsist on. Agriculture changed all that, generating an overwhelming reliance on a few dozen domesticated food sources, making you extremely vulnerable to the next famine, the next locust infestation, the next potato blight. Agriculture allowed for the stockpiling of surplus resources and thus, inevitably, the unequal stockpiling of them—stratification of society and the invention of classes. Thus, it allowed for the invention of poverty. I think that the punch line of the primate-human difference is that when humans invented poverty, they came up with a way of subjugating the low-ranking like nothing ever before seen in the primate world.