

May 13, 2013

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ometime in the late '50s, Frieda Fromm-Reichmann sat down to write an essay about a subject that had been mostly overlooked by other psychoanalysts up to that point. Even Freud had only touched on it in passing. She was not sure, she wrote, “what inner forces” made her struggle with the problem of loneliness, though she had a notion. It might have been the young female catatonic patient who began to communicate only when Fromm-Reichmann asked her how lonely she was. “She raised her hand with her thumb lifted, the other four fingers bent toward her palm,” Fromm-Reichmann wrote. The thumb stood alone, “isolated from the four hidden fingers.” Fromm-Reichmann responded gently, “That lonely?” And at that, the woman’s “facial expression loosened up as though in great relief and gratitude, and her fingers opened.” Fromm-Reichmann would later become world-famous as the dumpy little

therapist mistaken for a housekeeper by a new patient, a severely disturbed schizophrenic girl named Joanne Greenberg. Fromm-Reichmann cured Greenberg, who had been deemed incurable. Greenberg left the hospital, went to college, became a writer, and immortalized her beloved analyst as “Dr. Fried” in the best-selling autobiographical [novel](#) *I Never Promised You a Rose Garden* (later also a [movie](#) and a pop [song](#)). Among analysts, Fromm-Reichmann, who had come to the United States from Germany to escape Hitler, was known for insisting that no patient was too sick to be healed through trust and intimacy. She figured that loneliness lay at the heart of nearly all mental illness and that the lonely person was just about the most terrifying spectacle in the world. She once chastised her fellow therapists for withdrawing from emotionally unreachable patients rather than risk being contaminated by them. The uncanny specter of loneliness “touches on our own possibility of loneliness,” she said. “We evade it and feel guilty.”

Her 1959 essay, “On Loneliness,” is considered a founding document in a fast-growing area of scientific research you might call loneliness studies. Over the past half-century, academic psychologists have largely abandoned psychoanalysis and made themselves over as biologists. And as they delve deeper into the workings of cells and nerves, they are confirming that loneliness is as monstrous as Fromm-Reichmann said it was. It has now been linked with a wide array of bodily ailments as well as the old mental ones.

In a way, these discoveries are as consequential as the germ theory of disease. Just as we once knew that infectious diseases killed, but didn’t know that germs spread them, we’ve known intuitively that loneliness hastens death, but haven’t been able to explain how. Psychobiologists can now show that loneliness sends misleading hormonal signals, rejiggers the molecules on genes that govern behavior, and wrenches a slew of other systems out of whack. They have proved that long-lasting loneliness not only makes you sick; it can kill you. Emotional isolation is ranked as high a risk factor for mortality as smoking. A partial list of the physical diseases

thought to be caused or exacerbated by loneliness would include Alzheimer's, obesity, diabetes, high blood pressure, heart disease, neurodegenerative diseases, and even cancer—tumors can metastasize faster in lonely people.

The psychological definition of loneliness hasn't changed much since Fromm-Reichmann laid it out. "Real loneliness," as she called it, is not what the philosopher Søren Kierkegaard characterized as the "shut-upness" and solitariness of the civilized. Nor is "real loneliness" the happy solitude of the productive artist or the passing irritation of being cooped up with the flu while all your friends go off on some adventure. It's not being dissatisfied with your companion of the moment—your friend or lover or even spouse— unless you chronically find yourself in that situation, in which case you may in fact be a lonely person. Fromm-Reichmann even distinguished "real loneliness" from mourning, since the well-adjusted eventually get over that, and from depression, which may be a symptom of loneliness but is rarely the cause. Loneliness, she said—and this will surprise no one—is the want of intimacy.

Today's psychologists accept Fromm-Reichmann's inventory of all the things that loneliness isn't and add a wrinkle she would surely have approved of. They insist that loneliness must be seen as an interior, subjective experience, not an external, objective condition. Loneliness "is not synonymous with being alone, nor does being with others guarantee protection from feelings of loneliness," writes John Cacioppo, the leading psychologist on the subject. Cacioppo privileges the emotion over the social fact because—remarkably—he's sure that it's the *feeling* that wreaks havoc on the body and brain. Not everyone agrees with him, of course. Another school of thought insists that loneliness is a failure of social networks. The lonely get sicker than the non-lonely, because they don't have people to take care of them; they don't have social support.

To the degree that loneliness has been treated as a matter of public concern in the past, it has generally been seen as a social problem—the

product of an excessively conformist culture or of a breakdown in social norms. Nowadays, though, loneliness is a public health crisis. The standard U.S. [questionnaire](#), the UCLA Loneliness Scale, asks 20 questions that run variations on the theme of closeness—“How often do you feel close to people?” and so on. As many as 30 percent of Americans don't feel close to people at a given time.

Loneliness varies with age and poses a particular threat to the very old, quickening the rate at which their faculties decline and cutting their lives shorter. But even among the not-so-old, loneliness is pervasive. In a [survey published by the AARP](#) in 2010, slightly more than one out of three adults 45 and over reported being chronically lonely (meaning they've been lonely for a long time). A decade earlier, only one out of five said that. With baby-boomers reaching retirement age at a rate of 10,000 a day, the number of lonely Americans will surely spike.

Obviously, the sicker lonely people get, the more care they'll need. This is true, and alarming, although as we learn more about loneliness, we'll also be better able to treat it. But to me, what's most momentous about the new biology of loneliness is that it offers concrete proof, obtained through the best empirical means, that the poets and bluesmen and movie directors who for centuries have deplored the ravages of lonesomeness on both body and soul were right all along. As W. H. Auden put it, “We must love one another or die.”



Who are the lonely? They're the outsiders: not just the elderly, but also the poor, the bullied, the *different*. Surveys confirm that people who feel discriminated against are more likely to feel lonely than those who don't, even when they don't fall into the categories above. Women

are lonelier than men (though unmarried men are lonelier than unmarried women). African Americans are lonelier than whites (though single African American women are less lonely than Hispanic and white women). The less educated are lonelier than the better educated. The unemployed and the retired are lonelier than the employed.

A key part of feeling lonely is feeling rejected, and that, it turns out, is the most damaging part. Psychologists discovered this by, among other things, studying the experience of gay men during the first decade of the AIDS epidemic, when the condition was knocking out their immune systems, and, as it seemed at first, *only* theirs. The nation ignored the crisis for a while, then panicked. Soon, people all over the country were calling for gay men to be quarantined.

To psychologists trying to puzzle out how social experiences affect health, AIDS amounted to something of a natural experiment, the chance to observe the effects of conditions so extreme that no ethical person would knowingly subject another person to them. The disease came from a virus — HIV — that was neutralizing all the usual defenses of a discrete group of people who could be compared with each other and also with a control group of the uninfected. That allowed researchers in a lab at UCLA to take on one of life's biggest questions, which had become even more urgent as the disease laid waste to thousands, then tens of thousands: Could social experiences explain why some people die faster than others?

In the mid-to late '80s, the UCLA lab obtained access to a long-term study of gay men who enrolled without knowing whether they were infected with HIV. About half of them tested positive for the virus, and about a third of those agreed to let researchers put their lives under a microscope, answering extensive questions about drug use, sexual behavior, attitudes toward their own homosexuality, levels of emotional support, and so on. By 1993, around one-third of that group had developed full-blown AIDS, and slightly more than a quarter had died.

Steven Cole was a young postdoctoral student in the lab itching to move beyond his field's mind-body split. At the time, he told me, psychology was only just beginning to grasp "how the physical world of our bodies gets remodeled by our psychic and conceptual worlds." When the UCLA researchers started trying to figure out which social factors sped up the progress of the disease, they tested obvious ones like socioeconomic status and levels of support. Curiously, though, being poor or lacking family and friends didn't much change the rate at which an infected man would die of AIDS (although being in mourning, as gay men often were those days, did seem to weaken an infected man's immune system).

It eventually occurred to Cole to try to imagine the world from a gay man's perspective. That wasn't easy for him: "I'm a straight kid from the suburbs. I had stereotypes, but I didn't really know the reality of these people's lives." Then he read a [book](#), Erving Goffman's *Stigma: Notes on the Management of a Spoiled Identity*, that tallies in detail the difficulties of "passing" as someone else. He learned that the closeted man must police every piece of information known about him, live in constant terror of exposure or blackmail, and impose sharp limits on intimacy, or at least friendship. "It was like walking around with a time-bomb," says Cole.

Cole figured that a man who'd hide behind a false identity was probably more sensitive than others to the pain of rejection. His temperament would be more tightly wound, and his stress-response system would be the kind that "fires responses and fires 'em harder." His heart would beat faster, stress hormones would flood his body, his tissues would swell up, and white blood cells would swarm out to protect him against assault. If this state of inflamed arousal subsided quickly, it would be harmless. But if the man stayed on high alert for years at a time, then his [blood pressure](#) would rise, and the part of his [immune system](#) that fends off smaller, subtler threats, like viruses, would not do its job.

And he was right. The social experience that most reliably predicted whether an HIV-positive gay man would die quickly, Cole found, was

whether or not he was in the closet. Closeted men infected with HIV died an average of two to three years earlier than out men. When Cole dosed AIDS-infected white blood cells with norepinephrine, a stress hormone, the virus replicated itself three to ten times faster than it did in non-dosed cells. Cole mulled these results over for a long time, but couldn't understand why we would have been built in such a way that loneliness would interfere with our ability to fend off disease: "Did God want us to die when we got stressed?"

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he answer is no.

What He wanted is for us not to be alone. Or rather, natural selection favored people who needed people. Humans are vastly more social than most other mammals, even most primates, and to develop what neuroscientists call our social brain, we had to be good at cooperating. To raise our children, with their slow-maturing cerebral cortexes, we needed help from the tribe. To stoke the fires that cooked the meat that gave us the protein that sustained our calorically greedy gray matter, we had to organize night watches. But compared with our predators, we were small and weak. They came after us with swift strides. We ran in a comparative waddle.

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So what would happen if one of us wandered off from her little band, or got kicked out of it because she'd slacked off or been caught stealing? She'd find herself alone on the savanna, a fine treat for a bunch of lions. She'd be exposed to attacks from marauders. If her nervous system went into overdrive at perceiving her isolation, well, that would have just sent her scurrying home. Cacioppo thinks we're hardwired to find life unpleasant outside the safety of trusted friends and family, just as we're pre-programmed to find certain foods disgusting. “Why do you think you are ten thousand times more sensitive to foods that are bitter than to foods that are sweet?” Cacioppo asked me. “Because bitter's dangerous!”

One of those alone-on-the-savanna moments in our modern lives occurs when we go off to college, because we have to make a whole new set of friends. Back in the mid-'90s, when Cacioppo was at Ohio State University (he is now at the University of Chicago), he and his colleagues sorted undergraduates into three groups—the non-lonely, the sort-of-sometimes lonely, and the lonely. The researchers then strapped blood-pressure cuffs, biosensors, and beepers onto the students. Nine times a day for seven days, they were beeped and had to fill out questionnaires. Cacioppo also kept them overnight in the university hospital with “nightcaps” on their heads, monitoring the length and quality of their rest. He took saliva samples to measure levels of cortisol, a hormone produced

under stress.

As expected, he found the students with bodily symptoms of distress (poor sleep, high cortisol) were not the ones with too few acquaintances, but the ones who were unhappy about not having made close friends. These students also had higher than normal vascular resistance, which is caused by the arteries narrowing as their tissue becomes inflamed. High vascular resistance contributes to high blood pressure; it makes the heart work harder to pump blood and wears out the blood vessels. If it goes on for a long time, it can morph into heart disease. While Cole discovered that loneliness could hasten death in sick people, Cacioppo showed that it could make well people sick—and through the same method: by putting the body in fight-or-flight mode.

A famous experiment helps explain why rejection makes us flinch. It was conducted more than a decade ago by Naomi Eisenberger, a social psychologist at UCLA, along with her colleagues. People were brought one-by-one into the lab to play a multiplayer online game called “*Cyberball*” that involved tossing a ball back and forth with two other “people,” who weren’t actually people at all, but a computer program. “They” played nicely with the real person for a while, then proceeded to ignore her, throwing the ball only to each other. Functional magnetic resonance imaging scans showed that the experience of being snubbed lit up a part of the subjects’ brains (the dorsal anterior cingulate cortex) that also lights up when the body feels physical pain.

I asked Eisenberger why, if the same part of our brain processes social insult and bodily injury, we don’t confuse the two. She explained that physical harm simultaneously lights up another neural region as well, one whose job is to locate the ache—on an arm or leg, inside the body, and so on. What the dorsal anterior cingulate cortex registers is the *emotional* fact that pain is distressing, be it social or physical. She calls this the “affective component” of pain. In operations performed to relieve chronic pain, doctors have lesioned, or disabled, the dorsal anterior cingulate cortex.

After the surgery, the patients report that they can still sense where the trouble comes from, but, they add, it just doesn't bother them anymore.

**I**t's tempting to say that the lonely were born that way—it'd let the rest of us off the hook. And, as it turns out, we'd be about half right, because loneliness is about half heritable. A longitudinal study of more than 8,000 identical Dutch twins found that, if one twin reported feeling lonely and unloved, the other twin would report the same thing 48 percent of the time. This figure held so steady across the pairs of twins—young or old, male or female, notwithstanding different upbringings—that researchers concluded that it had to reflect genetic, not environmental, influence. To understand what it means for a personality trait to have 48 percent heritability, consider that the influence of genes on a purely physical trait is 100 percent. Children get the color of their eyes from their parents, and that is that. But although genes may predispose children toward loneliness, they do not account for everything that makes them grow up lonely. Fifty-two percent of that comes from the world.

Evolutionary theory, which has a story for everything, has a story to illustrate how the human species might benefit from wide variations in temperament. A group that included different personality types would be more likely to survive a radical change in social conditions than a group in which everyone was exactly alike. Imagine that, after years in which a group had lived in peace, an army of strangers suddenly appeared on the horizon. The tribe in which some men stayed behind while the rest headed off on a month-long hunting expedition (the stay-at-homes may have been less adventurous, or they may just have been loners) had a better chance of repelling the invaders, or at least of saving the children, than the tribe whose men had all enthusiastically wandered off, confident that

everything would be fine back home.

And yet loneliness is made as well as given, and at a very early age. Deprive us of the attention of a loving, reliable parent, and, if nothing happens to make up for that lack, we'll tend toward loneliness for the rest of our lives. Not only that, but our loneliness will probably make us moody, self-doubting, angry, pessimistic, shy, and hypersensitive to criticism. Recently, it has become clear that some of these problems reflect how our brains are shaped from our first moments of life.

Proof that the early brain is molded by love comes, in part, from another notorious [natural experiment](#): the abandonment of tens of thousands of Romanian orphans born during the regime of Communist dictator Nicolae Ceaușescu, who had banned birth control. A great deal has been written about the heartbreaking emotional and educational difficulties of these children, who grew up 20 to a nurse in Dickensian orphanages. In the age of the brain scan, [we now know](#) that those institutionalized children's brains developed less "gray matter"—that is, fewer of the neurons that make up the bulk of the brain—and that, if those children never went on to be adopted, they'd sprout less "white matter," too. White matter helps send signals from one part of the brain to another; think of it as the mind's internal Internet. In the orphans' case, the amygdala and the prefrontal cortex—which are involved in memory, emotions, decision-making, and social interaction—just weren't connecting.

There's a limit to how much we can poke around inside lonely humans, for obvious reasons. That's why a great deal of research on the biological effects of a lonely childhood involves monkeys. Last year, I visited a monkey lab in the rolling farmland of rural Maryland run by a burly and affable psychologist-turned-primatologist named Steve Suomi. Suomi conducts his experiments on rhesus macaques, adorable little creatures sometimes called a "weed species," because they, like humans, thrive in

most environments they're thrown into.

Suomi is building on research begun by his teacher and mentor, Harry Harlow, a psychologist at the University of Wisconsin notorious for experiments in the '50s and '60s. Harlow subjected newborn rhesus macaques to appalling isolation—months spent in cages in the company only of “surrogate mothers” made of wire with cartoonish monkey heads and bottles attached. Luckier monkeys had that and cloth-covered versions of the same thing to cuddle. (It is remarkable what a soft cloth can do to calm an anxious baby monkey down.) In the most extreme cases, the babies languished alone at the bottom of a V-shaped steel container. Cruel as these experiments were, Harlow proved that the absence of mothering destroyed the monkeys' ability to mingle with other monkeys, though the “cloth mother” could mitigate the worst effects of isolation. Years of monkey therapy were required to integrate them into the troop. Harlow's insights were not well received. Behaviorists, who reigned in U.S. psychology departments, held a blank-slate view of animal and human behavior. They scoffed at the notion that baby monkeys could be hard-wired for love, or at least for a certain quality of touch.

Times have changed, and Harlow's conviction that nature demands nurture is now the common view. (Changing laws also mean that Suomi would have a harder time getting away with such experiments, which he's not inclined to do anyway.) What Suomi has that Harlow did not have is technology. By shipping off monkey tissue to laboratories, such as Steve Cole's, that have machines capable of seeing which genes are turned on and which are turned off, Suomi can show that loneliness transforms the brain and body. He can match the behavior of the lonely monkeys as they grow—what they act like, where they rank in dominance hierarchies when they're introduced into a troop, whether they ever manage to reproduce—with the activity of genes that affect their brains and immune systems.

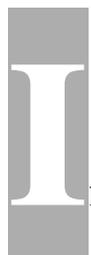
Suomi raises his monkeys in three groups, one group confined entirely to the company of peers (a chaotic, *Lord of the Flies* kind of childhood); another group left alone with terry-cloth mother-surrogates, except when released for a couple of hours a day to scamper with fellow babies; and the third raised by their mothers. What he found is that, in monkeys separated from their mothers in the first four months of life, some important immunity-related genes show a different pattern of expression. Among these were genes that help make the protein that inflames tissue and genes that tell the body to ward off viruses and other microbes.

Suomi was also excited about [results coming in](#) from peer-raised monkeys' brain tissue: Thousands of little changes in genetic activity had been detected in their prefrontal cortexes. This region is sometimes called the "CEO" of the brain; it restrains violent impulses and inappropriate behavior. (In humans, faulty wiring in the prefrontal cortex has been associated with schizophrenia and ADHD.) Some of the aberrations were on genes that direct growth of the brain; modifications of those were bound to result in altered neural architecture. These findings eerily echoed the Romanian orphans' brain scans and suggested that the lonely monkeys were going to be weirder than the others.

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“The very fact that something outside the organism can affect the genes like that—it’s huge,” Suomi says. “It changes the way one thinks about development.” I didn’t need genetics, though, to see how defective the peer-raised monkeys’ development had been. Suomi took me outside to watch them. They huddled in nervous groups at the back of the cage, holding tight to each another. Sometimes, he said, they invite aggression by cowering; at other times, they fail to recognize and kowtow to the alpha monkeys, so they get picked on even more. The most perturbed monkeys might rock, clutch at themselves, and pull out their own hair, looking for all the world like children with severe autism.

Suomi added that good foster care could greatly improve the troubled macaques’ lives. He pointed out some who had been given over to foster grandmothers. Not only did they act more monkey-like, but, he told me, about half of their genetic deviations had vanished, too.



If we now know that loneliness, a social emotion, can reach into our bodies and rearrange our cells and genes, what should we do about it? We should change the way we think about health. James Heckman, a Nobel Prize–winning economist at the University of Chicago who tabulates the costs of early childhood deprivation, speaks bitterly of “silos” in health policy, meaning that we see crime and low educational achievement as distinct from medical problems like obesity or heart disease. As far as he’s concerned, these are, in too many cases, symptoms of the same social disorder: the failure to help families raise their children. Heckman believes that the life of a child at the lower end of the U.S. socioeconomic spectrum is starting to look more like the life of one of Suomi’s lonely

macaques. As nearly half of all marriages continue to end in divorce, as marriage itself floats further out of reach for the undereducated and financially strapped, childhood has become a more solitary and chaotic experience. Single mothers don't have a lot of time to spend with their children, nor, in most cases, money for emotionally enriching social activities.

“As inequality has increased, childhood inequality has increased,” Heckman said, “So has inequality of parenting.” For the first time in 30 years, mental health disabilities such as ADHD outrank physical ones among American children. Heckman doesn't think that's only because parents seek out attention-deficit diagnoses when their children don't come home with A's. He thinks it's also because emotional impoverishment embeds itself in the body. “Mothers matter,” he says, “and mothering is in short supply.”

Heckman has been [analyzing data](#) from two famous early-childhood intervention programs, the Abecedarian Project of the '70s and the Perry Preschool project of the '60s. Both have furnished ample evidence that, if you enroll very young children from poor families in programs that give both them and their parents an extra boost, then they grow up to be wealthier and healthier than their counterparts—less fat, less sick, better educated, and, for men, more likely to hold down a job. In the case of the Perry Preschool, Heckman estimated that each dollar invested yielded \$7 to \$12 in savings over the span of decades. One of the most effective economic and social policies, he told me, would be “supplementing the parenting environment of disadvantaged young children.”

If you can't change society all at once, though, you can change it a few people at a time. Cacioppo and a colleague, Louise Hawkey, have been developing programs to teach lonely people to get along better with others. At one point, the psychologists thought of designing a mobile app, a sort of electronic nagging mother, to help people break bad social habits. (You'd check an item off the list, say, if you remembered to talk to

anyone that day—a store clerk or a librarian.) But they didn't get funding for the software, so now they're focusing on a simpler and more low-tech fix. It's a seminar with an instructor and a pointer and a screen in which students learn to read faces and interpret voices and also to stop making the assumption that lonely people seem prone to make, which is that every person they meet is judging or rebuffing them. What they're learning, says Hawkley, is the art of "social cognition." Her goal is to show people that they come at the world full of "assumptions about human nature, about social mores, that aren't necessarily accurate."

Cacioppo and Hawkley have been testing their social-cognition curriculum on Army bases, holding classes to hone soldiers' social skills and teach platoon leaders to spot the lonely in their ranks and help them fit in better. The results aren't in yet, U.S. Army psychologist Major Paul Lester told me, but he has been receiving reports that suggest that people who have gone through the training fall prey to post-traumatic stress disorder less often. Lester insisted that I add that the Army hadn't agreed to spend \$50 million a year for this experiment only because it's worried about suicide and post-traumatic stress disorder— although if loneliness training brought down the number of suicidal and dysfunctional soldiers, so much the better. The Army sees the classes as essential training for coping with military life. The best fighting comes from soldiers who interact well with other soldiers, said Lester, and soldiers' lives are full of social disruption—transfers from base to base and so on.

These are patch solutions, obviously, though it's appealing to imagine a social-cognition program filtering down and replacing the vague platitudes usually taught to elementary- and middle-schoolers in their human growth and development classes. And it would completely transform a child's world to have a teacher trained to identify the lonely kids in her classroom and to provide succor and support once she'd found them. Naomi Eisenberger pointed out to me that, while schools take physical pain very seriously, they usually trivialize social pain: "You cannot hit other students, but oftentimes, there are no rules about excluding another

student,” she said.

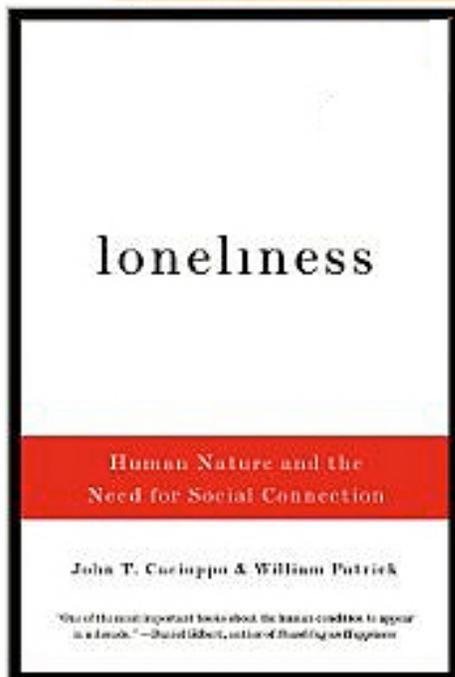
Cole can imagine giving people medications to treat loneliness, particularly when it exacerbates chronic diseases such as diabetes and high blood pressure. These could be betablockers, which reduce the physical effects of stress; anti-inflammatory medicine; or even Tylenol—since physical and emotional pain overlap, it turns out that Tylenol can reduce the pain of heartbreak.

At a deeper level, though, loneliness research forces us to acknowledge our own extraordinary malleability in the face of social forces. This susceptibility is both terrifying and exhilarating. On the terrifying side is the unhappy fact that isolation, especially when it stems from the disenfranchisement of the underprivileged, creates a bodily limitation all too easily reproduced in each successive generation. Given that we have been scaling back the kinds of programs that could help people overcome such disadvantages and that many in Congress, mostly Republicans, have been trying to defund exactly the kind of behavioral science research that could yield even better programs, we have reason to be afraid. But there’s something awe-inspiring about our resilience, too. Put an orphan in foster care, and his brain will repair its missing connections. Teach a lonely person to respond to others without fear and paranoia, and over time, her body will make fewer stress hormones and get less sick from them. Care for a pet or start believing in a supernatural being and your score on the UCLA Loneliness Scale will go down. Even an act as simple as joining an athletic team or a church can lead to what Cole calls “molecular remodeling.” “One message I take away from this is, ‘Hey, it’s not just early life that counts,’ ” he says. “We have to choose our life well.”

*Judith Shulevitz is the science editor of The New Republic.*

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Further reading [added by Gary]. Click on the image:



# loneliness

Human Nature and the  
Need for Social Connection

John T. Cacioppo & William Patrick

"One of the most important books about the human condition to appear  
in a decade." —David Gilbert, author of *Blissful as Hell*