improves the signal-to-noise ratio in the brain by removing the cause of the "noise." This process is constant and quick; synaptic connections can form in a matter of hours or days. Experience, particularly in childhood, sculpts the brain.

The classic demonstration of the impact of experience on brain growth was by Nobel Prize-winners Thorsten Wiesel and David Hubel, both neuroscientists.[10] They showed that in cats and monkeys, there was a critical period during the first few months of life for the development of the synapses that carry signals from the eye to the visual cortex, where those signals are interpreted. If one eye was kept closed during that period, the number of synapses from that eye to the visual cortex dwindled away, while those from the open eye multiplied. If after the critical period ended the closed eye was reopened, the animal was functionally blind in that eye. Although nothing was wrong with the eye itself, there were too few circuits to the visual cortex for signals from that eye to be interpreted.

In humans the corresponding critical period for vision lasts for the first six years of life. During this time normal seeing stimulates the formation of increasingly complex neural circuitry for vision that begins in the eye and ends in the visual cortex. If a child's eye is taped closed for even a few weeks, it can produce a measurable deficit in the visual capacity of that eye. If a child has had one eye closed for several months during this period, and later has it restored, that eye's vision for detail will be impaired.

A vivid demonstration of the impact of experience on the developing brain is in studies of "rich" and "poor" rats.[11] The "rich" rats lived in small groups in cages with plenty of rat diversions such as ladders and treadmills. The "poor" rats lived in cages that were similar but barren and lacking diversions. Over a period of months the neocortices of the rich rats developed far more complex networks of synaptic circuits interconnecting the neurons; the poor rats' neuronal circuitry was sparse by comparison. The difference was so great that the rich rats' brains were heavier, and, perhaps not surprisingly, they were far smarter at solving mazes than the poor rats. Similar experiments with monkeys show these differences between those "rich" and "poor" in experience, and the same effect is sure to occur in humans.

Psychotherapy—that is, systematic emotional relearning—stands as a case in point for the way experience can both change emotional patterns and shape the brain. The most dramatic demonstration comes

from a study of people being treated for obsessive-compulsive disorder.[12] One of the more common compulsions is hand washing, which can be done so often, even hundreds of times in a day, that the person's skin cracks. PET scan studies show that obsessive-compulsives have greater than normal activity in the prefrontal lobes.[13]

Half of the patients in the study received the standard drug treatment, fluoxetine (better known by the brand name Prozac), and half got behavior therapy. During the therapy they were systematically exposed to the object of their obsession or compulsion without performing it; patients with hand-washing compulsions were put at a sink, but not allowed to wash. At the same time they learned to question the fears and dreads that spurred them on—for example, that failure to wash would mean they would get a disease and die. Gradually, through months of such sessions, the compulsions faded, just as they did with the medication.

The remarkable finding, though, was a PET scan test showing that the behavior therapy patients had as significant a decrease in the activity of a key part of the emotional brain, the caudate nucleus, as did the patients successfully treated with the drug fluoxetine. Their experience had changed brain function—and relieved symptoms—as effectively as the medication!

CRUCIAL WINDOWS

Of all species we humans take the longest for our brains to fully mature. While each area of the brain develops at a different rate during childhood, the onset of puberty marks one of the most sweeping periods of pruning throughout the brain. Several brain areas critical for emotional life are among the slowest to mature. While the sensory areas mature during early childhood, and the limbic system by puberty, the frontal lobes—seat of emotional self-control, understanding, and artful response—continue to develop into late adolescence, until somewhere between sixteen and eighteen years of age.[14]

The habits of emotional management that are repeated over and over again during childhood and the teenage years will themselves help mold this circuitry. This makes childhood a crucial window of opportunity for shaping lifelong emotional propensities; habits

acquired in childhood become set in the basic synaptic wiring of neural architecture, and are harder to change later in life. Given the importance of the prefrontal lobes for managing emotion, the very long window for synaptic sculpting in this brain region may well mean that, in the grand design of the brain, a child's experiences over the years can mold lasting connections in the regulatory circuitry of the emotional brain. As we have seen, critical experiences include how dependable and responsive to the child's needs parents are, the opportunities and guidance a child has in learning to handle her own distress and control impulse, and practice in empathy. By the same token, neglect or abuse, the misattunement of a self-absorbed or indifferent parent, or brutal discipline can leave their imprint on the emotional circuitry.[15]

One of the most essential emotional lessons, first learned in infancy and refined throughout childhood, is how to soothe oneself when upset. For very young infants, soothing comes from caretakers: a mother hears her infant crying, picks him up, holds and rocks him until he calms down. This biological attunement, some theorists propose, helps the child begin to learn how to do the same for himself.[16] During a critical period between ten and eighteen months, the orbitofrontal area of the prefrontal cortex is rapidly forming the connections with the limbic brain that will make it a key on/off switch for distress. The infant who through countless episodes of being soothed is helped along in learning how to calm down, the speculation goes, will have stronger connections in this circuit for controlling distress, and so throughout life will be better at soothing himself when upset.

To be sure, the art of soothing oneself is mastered over many years, and with new means, as brain maturation offers a child progressively more sophisticated emotional tools. Remember, the frontal lobes, so important for regulating limbic impulse, mature into adolescence.[17] Another key circuit that continues to shape itself through childhood centers on the vagus nerve, which at one end regulates the heart and other parts of the body, and at the other sends signals to the amygdala via other circuits, prompting it to secrete the catecholamines, which prime the fight-or-flight response. A University of Washington team that assessed the impact of childrearing discovered that emotionally adept parenting led to a change for the better in vagus-nerve function.

As John Gottman, the psychologist who led the research, explained, "Parents modify their children's vagal tone"—a measure of how easily

triggered the vagus nerve is—"by coaching them emotionally: talking to children about their feelings and how to understand them, not being critical and judgmental, problem-solving about emotional predicaments, coaching them on what to do, like alternatives to hitting, or to withdrawing when you're sad." When parents did this well, children were better able to suppress the vagal activity that keeps the amygdala priming the body with fight-or-flight hormones—and so were better behaved.

It stands to reason that the key skills of emotional intelligence each have critical periods extending over several years in childhood. Each period represents a window for helping that child instill beneficial emotional habits or, if missed, to make it that much harder to offer corrective lessons later in life. The massive sculpting and pruning of neural circuits in childhood may be an underlying reason why early emotional hardships and trauma have such enduring and pervasive effects in adulthood. It may explain, too, why psychotherapy can often take so long to affect some of these patterns—and why, as we've seen, even after therapy those patterns tend to remain as underlying propensities, though with an overlay of new insights and relearned responses.

To be sure, the brain remains plastic throughout life, though not to the spectacular extent seen in childhood. All learning implies a change in the brain, a strengthening of synaptic connection. The brain changes in the patients with obsessive-compulsive disorder show that emotional habits are malleable throughout life, with some sustained effort, even at the neural level. What happens with the brain in PTSD (or in therapy, for that matter) is an analog of the effects all repeated or intense emotional experiences bring, for better or for worse.

Some of the most telling of such lessons come from parent to child. There are very different emotional habits instilled by parents whose attunement means an infant's emotional needs are acknowledged and met or whose discipline includes empathy, on the one hand, or self-absorbed parents who ignore a child's distress or who discipline capriciously by yelling and hitting. Much psychotherapy is, in a sense, a remedial tutorial for what was skewed or missed completely earlier in life. But why not do what we can to prevent that need, by giving children the nurturing and guidance that cultivates the essential emotional skills in the first place?

PART FIVE

EMOTIONAL LITERACY

15

The Cost of Emotional Illiteracy

It began as a small dispute, but had escalated. Ian Moore, a senior at Thomas Jefferson High School in Brooklyn, and Tyrone Sinkler, a junior, had had a falling-out with a buddy, fifteen-year-old Khalil Sumpter. Then they had started picking on him and making threats. Now it exploded.

Khalil, scared that Ian and Tyrone were going to beat him up, brought a .38 caliber pistol to school one morning, and, fifteen feet from a school guard, shot both boys to death at point-blank range in the school's hallway.

The incident, chilling as it is, can be read as yet another sign of a desperate need for lessons in handling emotions, settling disagreements peaceably, and just plain getting along. Educators, long disturbed by schoolchildren's lagging scores in math and reading, are realizing there is a different and more alarming deficiency: emotional illiteracy.[1] And while laudable efforts are being made to raise academic standards, this new and troubling deficiency is not being addressed in the standard school curriculum. As one Brooklyn teacher put it, the present emphasis in schools suggests that "we care more about how well schoolchildren can read and write than whether they'll be alive next week."

Signs of the deficiency can be seen in violent incidents such as the shooting of Ian and Tyrone, growing ever more common in American schools. But these are more than isolated events; the heightening of the turmoil of adolescence and troubles of childhood can be read for the United States—a bellwether of world trends—in statistics such as these:[2]

In 1990, compared to the previous two decades, the United States saw the highest juvenile arrest rate for violent crimes ever; teen arrests for forcible rape had doubled; teen murder rates quadrupled, mostly due to an increase in shootings.[3] During those same two decades, the suicide rate for teenagers tripled, as did the number of children under fourteen who are murder victims.[4]

More, and younger, teenage girls are getting pregnant. As of 1993 the birthrate among girls ten to fourteen has risen steadily for five years in a row—some call it "babies having babies"—as has the proportion of unwanted teen pregnancies and peer pressure to have sex. Rates of venereal disease among teenagers have tripled over the last three decades.[5]

While these figures are discouraging, if the focus is on African-American youth, especially in the inner city, they are utterly bleak—all the rates are higher by far, sometimes doubled, sometimes tripled or higher. For example, heroin and cocaine use among white youth climbed about 300 percent over the two decades before the 1990s; for African-American youth it jumped to a staggering *13 times* the rate of twenty years before.[6]

The most common cause of disability among teenagers is mental illness. Symptoms of depression, whether major or minor, affect up to one third of teenagers; for girls, the incidence of depression doubles at puberty. The frequency of eating disorders in teenage girls has skyrocketed.[7]

Finally, unless things change, the long-term prospects for today's children marrying and having a fruitful, stable life together are growing more dismal with each generation. As we saw in Chapter 9, while during the 1970s and 1980s the divorce rate was around 50 percent, as we entered the 1990s the rate among newlyweds predicted that two out of three marriages of young people would end in divorce.

AN EMOTIONAL MALAISE

These alarming statistics are like the canary in the coal miner's tunnel whose death warns of too little oxygen. Beyond such sobering numbers, the plight of today's children can be seen at more subtle levels, in day-to-day problems that have not yet blossomed into outright crises. Perhaps the most telling data of all—a direct barometer of dropping levels of emotional competence—are from a national sample of American children, ages seven to sixteen, comparing their emotional condition in the mid-1970s and at the end of the 1980s.[8] Based on parents' and teachers' assessments, there was a steady worsening. No one problem stood out; all indicators simply crept steadily in the wrong direction. Children, on average, were doing more poorly in these specific ways:

• *Withdrawal or social problems:* preferring to be alone; being secretive; sulking a lot; lacking energy; feeling unhappy; being overly dependent

• *Anxious and depressed:* being lonely; having many fears and worries; needing to be perfect; feeling unloved; feeling nervous or sad and depressed

• *Attention or thinking problems:* unable to pay attention or sit still; daydreaming; acting without thinking; being too nervous to concentrate; doing poorly on schoolwork; unable to get mind off thoughts

• *Delinquent or aggressive:* hanging around kids who get in trouble; lying and cheating; arguing a lot; being mean to other people; demanding attention; destroying other people's things; disobeying at home and at school; being stubborn and moody; talking too much; teasing a lot; having a hot temper

While any of these problems in isolation raises no eyebrows, taken as a group they are barometers of a sea change, a new kind of toxicity seeping into and poisoning the very experience of childhood, signifying sweeping deficits in emotional competences. This emotional malaise seems to be a universal price of modern life for children. While Americans often decry their problems as particularly bad compared to other cultures', studies around the world have found rates on a par with or worse than in the United States. For example, in the 1980s teachers and parents in the Netherlands, China, and Germany rated children at about the same level of problems as were found for American children in 1976. And some countries had children in worse shape than current U.S. levels, including Australia, France, and Thailand. But this may not remain true for long. The larger forces that propel the downward spiral in emotional competence seem to be picking up speed in the United States relative to many other developed nations.[9]

No children, rich or poor, are exempt from risk; these problems are universal, occurring in all ethnic, racial, and income groups. Thus while children in poverty have the worst record on indices of emotional skills, their *rate* of deterioration over the decades was no worse than for middle-class children or for wealthy children: all show the same steady slide. There has also been a corresponding threefold rise in the number of children who have gotten psychological help

(perhaps a good sign, signaling that help is more available), as well as a near doubling of the number of children who have enough emotional problems that they *should* get such help but have not (a bad sign)—from about 9 percent in 1976 to 18 percent in 1989.

Urie Bronfenbrenner, the eminent Cornell University developmental psychologist who did an international comparison of children's well-being, says: "In the absence of good support systems, external stresses have become so great that even strong families are falling apart. The hecticness, instability, and inconsistency of daily family life are rampant in all segments of our society, including the well-educated and well-to-do. What is at stake is nothing less than the next generation, particularly males, who in growing up are especially vulnerable to such disruptive forces as the devastating effects of divorce, poverty, and unemployment. The status of American children and families is as desperate as ever.... We are depriving millions of children of their competence and moral character."[10]

This is not just an American phenomenon but a global one, with worldwide competition to drive down labor costs creating economic forces that press on the family. These are times of financially besieged families in which both parents work long hours, so that children are left to their own devices or the TV baby-sits; when more children than ever grow up in poverty; when the one-parent family is becoming ever more commonplace; when more infants and toddlers are left in day care so poorly run that it amounts to neglect. All this means, even for well-intentioned parents, the erosion of the countless small, nourishing exchanges between parent and child that build emotional competences.

If families no longer function effectively to put all our children on a firm footing for life, what are we to do? A more careful look at the mechanics of specific problems suggests how given deficits in emotional or social competences lay the foundation for grave problems—and how well-aimed correctives or preventives could keep more children on track.

TAMING AGGRESSION

In my elementary school the tough kid was Jimmy, a fourth grader when I was in first grade. He was the kid who would steal your lunch money, take your bike, slug you as soon as talk to you. Jimmy was the

classic bully, starting fights with the least provocation, or none at all. We all stood in awe of Jimmy—and we all stood at a distance. Everyone hated and feared Jimmy; no one would play with him. It was as though everywhere he went on the playground an invisible bodyguard cleared kids out of his way.

Kids like Jimmy are clearly troubled. But what may be less obvious is that being so flagrantly aggressive in childhood is a mark of emotional and other troubles to come. Jimmy was in jail for assault by the time he reached sixteen.

The lifelong legacy of childhood aggressiveness in kids like Jimmy has emerged from many studies.[11] As we have seen, the family life of such aggressive children typically includes parents who alternate neglect with harsh and capricious punishments, a pattern that, perhaps understandably, makes the children a bit paranoid or combative.

Not all angry children are bullies; some are withdrawn social outcasts who overreact to being teased or to what they perceive as slights or unfairness. But the one perceptual flaw that unites such children is that they perceive slights where none were intended, imagining their peers to be more hostile toward them than they actually are. This leads them to misperceive neutral acts as threatening ones—an innocent bump is seen as a vendetta—and to attack in return. That, of course, leads other children to shun them, isolating them further. Such angry, isolated children are highly sensitive to injustices and being treated unfairly. They typically see themselves as victims and can recite a list of instances when, say, teachers blamed them for doing something when in fact they were innocent. Another trait of such children is that once they are in the heat of anger they can think of only one way to react: by lashing out.

These perceptual biases can be seen at work in an experiment in which bullies are paired with a more peaceable child to watch videos. In one video, a boy drops his books when another knocks into him, and children standing nearby laugh; the boy who dropped the books gets angry and tries to hit one of those who laughed. When the boys who watched the video talk about it afterward, the bully always sees the boy who struck out as justified. Even more telling, when they have to rate how aggressive the boys were during their discussion of the video, the bullies see the boy who knocked into the other as more combative, and the anger of the boy who struck out as justified.[12]

This jump to judgment testifies to a deep perceptual bias in people