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TENDING INSTINCT

How Nurturing Is Essential for Who We Are and How We Live

Shelley E. Taylor

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| CHAPTER 2 |

The Origins of Tending

Fight or flight is the metaphor for how we respond to our stressful lives, or so scientists have believed for decades. The images of this coordinated stress response are familiar to all, chronicled daily in scenes of wildlife on television. One animal stalks another, the ears of the potential prey go up, and soon it is running for its life. Two animals, an elephant and a rhinoceros, perhaps, have a chance encounter at a water hole, and, in short order, they are locked in a life-and-death struggle.

Just as these images characterize our thoughts about animal behavior, so we have believed that fight or flight explains most of what is important about human responses to stress as well. Walter Cannon, an eminent scientist and physician in the 1930s, may be credited with giving us these early insights. Cannon had a patient named Tom, who, because of a medical disorder, had to be fitted with a gastric fistula, permitting Cannon a rare glimpse into the mucosa that line the stomach. When Tom was angry, Cannon observed, the mucosa became engorged with blood, readying Tom for a brisk, decisive response to the threat—fight or flight, as Cannon came to call it.

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As a stress researcher, I have subscribed to the fight-or-flight metaphor for much of my career, even as my own work told me it was incomplete. For many years, I have studied how people cope with stress both biologically and through their actions. I've interviewed hundreds of people trying to come to terms with unexpected setbacks or losses and listened to accounts of how their lives had changed as a result. Fight or flight responses, such as anger over the injustice of their plight, frantic efforts to restore a loss such as good health, and, sometimes, depressed withdrawal as the inevitability of the setback became clear, were certainly a part of these coping efforts, but they left a great deal out. Fight or flight represents each of us as solitary figures in our battles with threat, a portrait that belies what human beings actually do. In interviews with women who had breast cancer, for example, I heard how they came to value the relationships in their lives, tending to others even when they needed tending themselves, and drawing sustenance from their friends and relatives. I repeatedly heard accounts from women who had reordered their priorities and values to make time for grown children and women friends. Yet for years, I ignored the centrality of social ties for managing stress, accepting instead the conventional wisdom.[1]

In science, as in other aspects of life, you can know something without realizing that you know it, and only when some jarring incongruity forces a contradiction to the forefront of your mind do you recognize what your previously implicit knowledge really means. So it was with my understanding of human responses to stress.

On a Thursday in March 1998, my students and I attended a lecture on the amygdala, a portion of the brain believed to be critical to the experience of fear. The amygdala is also involved in some of our quickest responses to threat, and so how it works is critical to the study of stress—hence, my interest.

As the speaker described his very able research program, he interjected some observations about the rat participants in his studies that gave me pause. "Of course we had to house all the rats separately, so they wouldn't attack each other," he explained. Attack each other? I study

people under stress, and attack is not what you typically see. In fact, quite the opposite—people often turn to one another for solace and support. He went on in this vein for an hour, describing rats who aggressed against their cage mates, the victims who cowered in the corners of their cages, all of them facing a short, brutal life, the fallout of continuous fighting or unsuccessful efforts to flee.

After the talk, I assembled my research group, and during our discussion I mentioned some of these anomalous comments. "You know animal researchers study only male rats," offered one of my postdoctoral students. I had known this, of course, but it had never seemed to be a potential insight until now. She went on: "Female rats have such rapid hormonal changes that you can't get a clear picture of their stress responses." "Most of the biological studies of human stress use only men, too," added a neuroscience student.

An epiphany in science is fairly rare, but when it happens, there is no sensation like it. The sudden recognition that all of the classic theories of stress were based almost entirely on males was a stunning revelation. I remember thinking, I didn't know there were any big mistakes left in science. We stared at one another as the opportunity that lay before us became clear: a chance to start over and discover what females do in response to stress.

Over the next few months, we ransacked the scientific literature and discovered that, indeed, most of the science of stress is based on males. So common is the convention of studying only male rats in animal research that many scientists do not even bother to mention the sex of their rats in their scientific papers, which is one of the reasons why the male bias was such a well-kept secret.

The research on humans was even more surprising. Women's hormones cycle just as female rats' hormones do, of course, but they do so quite predictably and over twenty-eight days, so there is no particular reason to exclude women from studies of stress. Yet prior to the mid-1990s, only about 17 percent of the participants in studies of biological responses to stress were women.

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biased representation of men in stress research but rather by the problems this bias creates for our understanding of heart disease, an illness believed to be heavily influenced by stress and by poor ways of managing it. The overwhelming majority of studies on the causes and course of heart disease have been conducted with men, and many of our medications and recovery programs for treating heart disease have been tested only on men as well. This bias is especially unnerving when you realize that more women than men actually die of heart disease, albeit later in life. Responding to pressure from women scientists and women's groups, the government mandated that research studies had to include both sexes.

Since this ruling, about 200 studies of stress have been published that have included about 15,000 people. Nearly 43 percent of the participants have been women, which, of course, is much better.[2] Unfortunately, though, few of these studies have compared men's and women's responses to stress, and so we still know relatively little about the differences in how men and women manage stress. Moreover, many studies of responses to particular stressors remain perversely based on either men or women, but not both. For example, studies of how people react to physical stress such as exercise include mostly men, and studies of social behavior during stress rely heavily on women, which makes it hard to piece together what men and women do that is different. Accordingly, armed with this background, we set some daunting tasks for ourselves: to ascertain how ignoring the experience of women might have biased the scientific understanding of stress and to see in what ways men and women might differ in their responses to stress.

As a point of departure, we turned to evolutionary theory. Evolutionary theory guides the study of biology and increasingly the study of psychology as well. As one scientist friend put it, "Evolution isn't just the best game in town, it's the only game in town." If you can't square your ideas with evolution, your scientific battles will be uphill.

Evolutionary theory provides good reasons for believing that many of men's and women's reactions to stress will be similar. Human beings' stress responses most likely evolved during the million or so years that we were hunters and gatherers, during the Pleistocene era. Natural

selection heavily shaped these responses, since people without effective responses to stress would have died young without passing on their genetic heritage to any offspring. Predators, natural disasters, and skirmishes with outsiders were among the formidable threats that our human ancestors faced. And as these threats were common to both men and women, it follows that our stress responses would have evolved in much the same way.

What are these responses? Most commonly you experience arousal—your heart races, your blood pressure goes up, you sweat, and your hands tremble a little. The chemicals epinephrine and norepinephrine surge through the body, getting you ready to take action against the threat or get out of the way. These are the biological origins of the fight-or-flight response; if you are a scientist, you call it sympathetic activation.

The second stress system is the hypothalamic-pituitary-adrenocortical system (HPA). You don't feel the HPA response as clearly as you feel sympathetic arousal, but those sensations of anxious worrying, that feeling of lurking menace during times of stress, may be part of it. When stress activates the HPA, hormones are released that shut down nonessential bodily activities in favor of activities that promote timely and effective responses to stress, such as mental alertness and the release of energy. These stress systems get the body ready to cope with a stressor, and so in this sense they are vital to staving off threats. Men and women experience these aspects of stress fundamentally the same way. At the sight of a potential predator, arousal goes up for men and women alike.

But men and women faced some different challenges, too. Females of all species, including humans, have been the primary caretakers of offspring, and females' responses to stress would have evolved so as to include some measure of protection for their children. Otherwise, how could women have passed on their genes? If, as a mother, you flee from a menacing predator but leave your bewildered toddler unprotected, that child's chances of survival are clearly very poor. Consequently, responses to stress that favored both the mother's and the child's survival would most likely be passed on.[3]

What would those responses be? After our scientific epiphany, a group of us, three men and three women with expertise in neuroscience

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evolution, stress, and social support, started meeting regularly to formulate an answer to this question. We began the way a lot of science begins, with brainstorming sessions filled with uncensored hunches and speculation. We started with images: the brightly colored male drawing away a predator while the more drab female quietly covers the offspring, evading detection. We looked for human evidence of tending in females, the ability to calm down offspring and fade into the surroundings without attracting attention. From our research with humans, we knew that women turn to the social group in times of stress, and so we looked for patterns of "befriending." We constructed our theory around these two pivotal observations about female responses to stress—protecting offspring and turning to others—and accordingly called it "tend and befriend."

Our basic points are these: In times of stress, a mother's "tending"—that is, quieting and caring for offspring and blending into the environment—is effective for meeting a broad array of threats. Calming the young and getting them out of harm's way can ensure that their lives will continue. But protecting both yourself and your offspring is a formidable task, and so women who drew effectively on the social group for help may have more successfully dealt with threats than those who did not—hence, the befriending response. Turning to the social group in times of stress protects both men and women, of course, but the social group especially aids women and children since it provides others who can watch out for the safety of youngsters and protect them, if the need arises.

What about the fight-or-flight response? Wouldn't we expect women to show this reaction to stress, just as men do? Certainly women experience the arousal that accompanies threat, just as men do, but fighting and fleeing may not always be among the most adaptive ways for them to respond. Flight by a mother can be impractical with young, immature offspring in tow, and should the mother flee without her young, they could be left fatally unprotected. Fight, likewise, is risky. Unless a mother and her young are attacked by a predator, giving the mother no choice but to defend them, attempting to fight a foe may well be fatal to mother and offspring alike.

Indeed, the fight-or-flight response to stress may be a more viable response to stress for males than for females. Male hormones, especially testosterone, appear to fuel the fight response, and a lot of evidence, ranging from boys fighting on the playground to violent crime statistics, suggests that physical aggression in response to stress is much more often the province of males than females. Flight, too, may be easier for males, if they are unencumbered by the demands of others.

From an evolutionary standpoint, tend and befriend is a plausible account of female responses to stress. Volumes of scientific work attest to animals' maternal behavior under stress, and research on humans shows some of the same patterns. What is some of this evidence? Many people would argue that we need little proof that women tend to offspring, that it's so self-evident as to scarcely require evidence. Certainly, it is the case that throughout history, and across cultures, women have been the tenders of children. And, rhetoric aside, even in countries where traditional sex roles have encountered their greatest challenges, as in the United States, women continue to be the mainstay of caring for children by a large margin. (By these observations, I do not mean that women should or must care for children or that only women can care for children, only that they are more likely to do so.) The notion of tending, however, includes something more than child care, namely a propensity to turn to offspring and to nurture them when conditions grow more stressful.

An example of what I mean by tending can be found in the fascinating research of Rena Repetti, a developmental and clinical psychologist at UCLA. Since the beginning of her career, Repetti has been interested in how men and women manage the stress of work life while simultaneously juggling the demands of a family. As a talented and busy scientist and the mother of two spirited daughters, Repetti also has a personal stake in answering this question: How *do* parents manage it? The approach she takes to this issue is straightforward. She locates working parents and has them complete questionnaires about the events of specific workdays and their subsequent activities at home. She also asks their children to fill out questionnaires about their day's experiences, particularly their parents' behavior toward them, and then Repetti compares the parents' and children's responses.

Notes

Chapter 1: The Power of Tending

1. Widdowson (1951).
2. See Bell (2001) for a discussion of how caregiving has been relatively ignored in work on evolutionary theory. Unlike other "instincts," which are possessed by individuals, tending assumes the form of reciprocal, complementary relationships between individuals that are evoked by need or signals of distress, maintained by attachment or bonding, and sustained by a common or overlapping biology, with the primary function of regulating, especially reducing, physiological and neuroendocrine responses to stress. This tending affects brain development, genetic expression, the development of social and emotional skills, stress responses, and health. These effects are especially evident in the mother-infant interaction but continue throughout life and are affected by all tending relationships and their absence as well.
3. Moore (2001).
4. See Baumeister and Leary (1995); Caporeal (1997).
5. Dettwyler (1991); Silk (1992).
6. In arguing that there is an affiliative neurocircuitry that underlies social relationships of all kinds, I do not mean to suggest that the *same* hormones are involved in all social relationships. There is considerable differentiation based on what the relationships are. Nonetheless, there do seem to be some overlap and commonalities in the underlying biological structure. For perspectives on these issues, see Panksepp (1998) and Carter, Lederhendler, and Kirkpatrick (1999).

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7. Sanders and Gray (1997). For a general discussion of the important role that environmental and behavioral influences play in regulating gene activity, see Gottlieb (1998).
8. For biological perspectives on infanticide, see Hrdy (1999); Van Schaik and Dunbar (1990).

Chapter 2: The Origins of Tending

1. Stress responses may be thought as of adaptive mechanisms that allocate energy among different bodily functions including immunity, growth, reproduction, muscle action, and cognition. Conditions of threat lead to reallocation of resources from the normal steady state to prepare the body to meet a challenge. For a discussion of the historical origins of the fight-or-flight response, see Cannon (1932) and Selye (1956). For a perspective on how the fight-or-flight metaphor has guided research on stress and coping, see Taylor (1999). For an early account of the centrality of social relationships to coping in my work, see Taylor (1989).
2. See Taylor, Klein, Lewis, Gruenewald, Gurung, and Updegraff (2000) for an analysis of the gender composition of stress studies; see Rodin and Ickovics (1990) for a discussion of the underrepresentation of women in clinical trials. In a particularly remarkable example, 100 percent of the testing of the active agent in weight-loss pills (phenylpropanolamine) was done on men, despite the fact that 90 percent of the users of weight-loss pills are women (Hamilton, 1989).
3. Scientists believe that during our early prehistory, humans opted for fewer offspring spaced far apart. Because each child requires so much care, births may have been spaced up to four years apart or more so that women could provide a continual source of nutrition through lactation and manage foraging demands while simultaneously caring for an infant. With the development of agriculture, these demands on the mother subsided somewhat, making larger families with more offspring spaced closely together possible (see Hrdy, 1999, for a discussion of these issues).

   Parasympathetic regulation plays an important role in these processes, which I will largely relegate to the footnotes. The parasympathetic system is an important counterregulatory influence on the sympathetic activation of fight or flight. Any time we see an animal's or human's stress responses compromised by long-term exposure to stress, we need to entertain the hypothesis that parasympathetic functioning, in addition to sympathetic regulation, may have been altered in response to these stressors.
4. See Repetti (1989, 1997, 2000) and Repetti and Wood (1997). For another perspective on this issue, see studies on work spillover effects; specifically, these studies show that men are more likely to bring their stress home from work into the family environment than women are (see Bolger, DeLongis, Kessler, and Schilling, 1989; Stets, 1995).
5. Luckow, Reifman, and McIntosh (1998). Note that there is substantial cross-cultural evidence for this finding as well (Edwards, 1993; Whiting and Whiting, 1975).
6. Early life experiences literally craft HPA functioning. Meaney and his associates have found that early life stimulation in the form of gentle stroking attenuates behavioral and neuroendocrine responses to stressors across the life span, but in contrast, early life exposure to protracted stress (usually separation from the mother) leads to exaggerated