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PSY-385-001
24. February.2010
Book Review

Why Zebras Don't Get Ulcers, written by Robert Sapolsky, explains the connections between prolonged physical and psychological stress and various physiological and psychological disorders. Sapolsky is a professor of Biological Sciences, Neurology and Neurological Sciences at Stanford University, as well as a research associate at the Institute of Primate Research. With his vast background in primate biology and neurology, Sapolsky examines stress response and the long-term implications of stress in humans as well as in other non-human mammals. This provides a nice evolutionary framework for a variety of stress-induced afflictions.

Why Zebras Don't Get Ulcers is organized in a way that is understandable for a reader with little biological or psychological background, but is not overly simplistic so that a reader at any background can enjoy the content. Sapolsky begins by introducing different types of stress (acute physical, chronic physical, and psychological/social) and the concept of homeostasis and how stress response occurs to maintain a homeostatic balance within organisms. He then explains the process of hormone and neurotransmitter release, an overview of the effects of the autonomic nervous system and how that system is activated in response to stress. These first two chapters provide a brief introduction to the concepts covered in the remainder of the book.

Following this overview, Sapolsky introduces the effects of chronic stress on various body systems, including the circulatory, gastrointestinal, and reproductive systems. Within these individual chapters, he starts with a physiological outline of how stress alters specific hormonal pathways, resulting in abnormalities (e.g. how chronic stress leads to cardiovascular disease or irregularities in female menstrual cycles). There is a progression in the topics covered in this book that start mainly physiological in their nature (e.g. the explanation of hormones and how long term stress leads to cardiovascular problems and reproductive problems) to topics that are generally psychological in nature, but in which biology is very important (e.g. the relationship between stress and sleep, memory, and sleep). There is a pattern within each of these topics that connects the importance of glucocorticoids (a class of hormones that respond to stress) to each of the different body systems/areas affected by stress. The book explains that within the cardiovascular system, for example, release of glucocorticoids activate neurons that stimulate the sympathetic nervous system, ultimately shifting the heart into a higher gear as a response to a stressor. In response to short-term stress, this is beneficial, but what happens in someone experiencing chronic stress? Long-term overactivation of the heart leads to basic wear and tear, leading to a damaged heart. Glucocorticoids also play an important role in immune suppression, shrinking the thymus gland, leading to a halt in the formation of lymphocytes (agents important in attacking foreign agents).

By this point in the book, there is a strong biological and neurological emphasis on the relationship between long-term stress and different outcomes (e.g. disease, memory impairment, immunity). Sapolsky now takes the time to explain how psychology plays into stress, disease, and what makes something "stressful." He makes a perfect analogy to describe the relationship between the role of glucocorticoids in stress-response and how that same stress-response can be modulated by psychological factors. The physiology had been examined and described by bioengineers, comparing the body to a set of circuits. A simple experiment was then performed. A pain stimulus was given to an organism that, in accordance to the bioengineers, elicited a stress-response. A second pain stimulus was given, but under this condition, the subject of the experiment is a child who is immediately comforted by its mother, leading to a decreased stress-response. This response, according to Sapolsky, could not be explained by the bioengineers; this is where psychology enters the stress-response equation. Because a stress-response can be elicited regardless of psychological or perceptive response, it can not be explained exclusively by psychology. At this point in the book, Sapolsky explains why psychological stress is just as stressful as physical stress, though the two can be explained by different variables.

There is a strong fascination with disease in our society, whether physiological or psychological. Robert Sapolsky integrates snippets of diseases throughout each major chapter of his book, whether it be AIDS and how stress-induced immunosuppression can dramatically change the course of the disease, or how stress paired with anorexia can disrupt a females reproductive cycle. The most interesting disease topic covered in this book, at least in my mind, is the chapter on stress and depression.

Sapolsky refers to depression as the "bread and butter of human misery" and quotes Martin Seligman, a psychologist, referring to depression as the "common cold of psychopathy." Unlike most of the other disease topics mentioned in this book, Sapolsky dedicates an entire chapter to the topic of depression, beginning with a typical overview, explaining the varying symptoms (including cognitive, affective, neurochemical, and physiological), the neurochemistry of depression (e.g. the role of three major neurotransmitters-norepinepherine, serotonin, and dopamine), and the neuroanatomy of depression. After an extensive overview of the disease, Sapolsky begins connecting depress to the overarching topic of this book-stress. In most topics covered in the book, the link between stress and a given disease is one-way, with stress causing/leading to/influencing that disease. This is not the case with depression; the link runs both ways, with depression causing a person to increase their stress-response to a given person and the more obvious link with stress causing a person to succumb more easily to depression.

Like nearly everything mentioned in this book, glucocorticoids are major players in the relationship between stress and depression. Sapolsky goes into great detail explaining not only how glucocorticoids affect a person who already has a diagnosis of major depression, but also what happens when these hormone levels are increased before the onset of depression. Sapolsky makes a connection between the three major neurotransmitters involved in depression and how stress (mainly the hormonal stress-

response, releasing glucocorticoids) can alter the normal function of these transmitters. Stress-response is not only a hormonal response; there is a connection between learned helplessness of a stressful situation. The remainder of the chapter links the hormones and neurotransmitters involved in stress and ultimately depression to explain the success (in most cases) and future of anti-depressant drugs. The topic of depression and stress, as covered in this book, is fascinating to me because it argues some misconceptions society has about people who are depressed, mainly that people suffering from depression don't have a strong enough will power to overcome stressful events, or that there is no real difference between feeling depressed every once and a while ("feeling blue") and suffering major depression.

From the start of this book, the outlook of stress on longevity and health has been a bleak one. Sapolsky ends the book with a chapter on managing stress. This chapter covers stress management techniques that are probably not a mystery to most readers. Exercise improves mood and decreases stress response, but in moderation (too much exercise actually increases stress response). Meditation, controlling what you can in life, increasing social support, as well as religion and spirituality all have a positive effect on mood and help decrease stress. This chapter is not meant to convey new information, but more likely to leave the reader with a sense that we are not doomed for some form of stress-related illness in our lifetime.

I would highly recommend this book to anyone who is interested in stress as a general topic, disease, or the relationship between psychology and biological systems. Sapolsky does a great job in integrating psychology, physiology, and neurology into a book that is not packed full of confusing scientific terms and concepts. He writes intelligently but comically to grab the reader's attention quickly and to maintain that attention throughout the entire book. Though many of the concepts are integrated, the chapters are organized in a fashion that a reader is not forced to follow the chronological order of the chapters, but to jump around to topics that are most interesting. The book itself is lengthy (418 pages with 100 pages of notes at the end) but because of the way in which Sapolsky wrote it (adding comedic elements, writing in a style suitable for anyone outside the scientific community) it is well worth the length and the price ($18.00).