

Teenage Stress: Surviving in the Twenty-First Century

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INTRODUCTION

As a teacher I witness daily teenagers dealing with frustrations that affect their education. Many are courageous and cheerful in the midst of stressful situations. Others become statistics in increasing rates of teenage violence, suicide, obesity and diabetes (1). I think that the message is clear. Adults should take action to help young people reduce and manage stress.

The notion that the mind affects the health of the body is not a new concept. Hippocrates, the “Father of Medicine,” recognized that both the mind and body contributed to illness. Later a French physiologist, Claude Bernard, proposed that illness occurred when a person’s internal milieu became unbalanced, and that breaks in communication with the outside environment contributed to this condition. Building upon Bernard’s work, Hans Selye formulated his theory of stress in the 1930s. In his writings, Selye described the relationship between external demands in the environment and nonspecific neural and hormonal responses of the body (2). He was able to demonstrate that stress caused physical changes in organs of the body. Not only does stress damage the body, but many times, behaviors are inappropriate. For teenagers becoming adults, developing unhealthy patterns to manage stress early in life will later certainly produce devastating results. The situation is not hopeless. I firmly believe that teenagers are capable of managing stress effectively with the proper tools and support.

The purpose of this curriculum unit is to provide high school students with the knowledge, skills, and understandings necessary to manage stress. Students will be able to:

1. Explain why it is important to positively deal with stress
2. Identify signs and symptoms of stress
3. Choose a stress management technique to control stress.

There are three premises that I believe are important in teaching this curriculum unit. The first is that awareness and understanding of the nature of stress that empowers people. One may not be able to change outward circumstances, but one may be able to control one’s own reactions—for example by biofeedback. Second, ownership in learning occurs when everyone is allowed to share their ideas. Third, one key to keeping stress within manageable boundaries is to balance competing demands in different areas of one’s life.

This curriculum unit will rely heavily on definitions of terms, models, and open-ended questions. Teenagers will be encouraged to make connections between external events, their thinking about the events, and their feelings, body chemistry, and behaviors.

The teacher should help teenagers discover these connections by acting as a facilitator. The definitions of terms (see Appendix), models, stages and concepts of stress that follow are intended to provide the facilitator with a foundation of understanding to build upon.

MODELS OF STRESS

Models are important because they may serve as a visual representation of subjective processes and they enable one to structure one's thinking (4). Any model of stress must be functional in the sense that it enables people to identify causes of stress, understand reactions to stress, and choose alternative actions to an automatic stress response.

Mathematical Models

In physics stress is defined as force divided by area (5). The equation is:

$$\text{Stress} = \text{Force} / \text{Area}$$

Force may be likened to the intensity, frequency, and duration of the stressor. Area may be thought of as the physical, psychological, and environmental resources available to combat the effects of a stressor. The amount of stress is either large or small depending on the ratio of stressors to resources.

Strain in physics occurs when a material no longer returns to its original shape. The equation for strain is:

$$\text{Strain} = \text{Change in Length} / \text{Original Length}$$

A great amount of stress over a long period of time is likely to produce strain in a material or in terms of human stress a physical or psychological illness.

Environmental and Psychological Models

The systems model of disease is a viable one to explain the relationship between a measured physiological response and associated psychological, environmental, and social factors. Many people today are familiar with computers, and systems theory parallels computer procedures such as information input, processing, and output. A stressor may be likened to information input, processing to the evaluation of the importance and relevance of the stressor, and output as the emotional, physiological, and behavioral response to the evaluation. A simple model (2) (6) is:

Individual System

Input Processing Output
Stressor → *Nervous System* → *Behavior/Physiological Change*

In systems theory, life is viewed as a hierarchy of integrated systems that coordinate and regulate themselves through communicative feedback loops. This synergy of the systems is for a person who is goal-oriented. Perturbations or stressors are natural in life, and feedback signals produce adjustments in systems higher or lower than the original stimulus. For example, in downward disruption a man laid off from work may experience economic and family problems resulting in emotional stress. The built up stress may target various organs resulting in psychosomatic symptoms and real organ pathology. If the spiral downward through the hierarchy of feedback linkages cannot be halted, death may result (2). An example of a hierarchy of systems is:

Systems in Life

Environment → *Nation* → *Community* → *Employment* → *Family* → *Person* →
Body system → *Organ* → *Cells* → *Organelles*

A rationale for using the systems model is the notion that the negative effects of stress may be halted by an intervention at any level in the hierarchy of systems. For example; at a community level a man may look for another job and be rehired, at a personal level counseling may improve family communication and relieve anxiety, at a physical level medication may halt the out-of-balance hormonal discharge.

Psychological Model

One important model of a psychological system within a systems model is the relationship of events, thoughts, and feelings (1):

Event - → *Thoughts* - → *Feelings (may lead to distress)*

An event may be either physiological or psychological in nature. An individual's thoughts are a result of an appraisal of the event. The values one holds may affect one's perception of an event as threatening or non-threatening. Teenagers are in a state of mental flux because they are trying to establish their own autonomy and personal value systems separate from their parents. Hence, it is important for them to be aware of values that may affect the way in which they appraise an event. Feelings are the result of thoughts. The implication is that negative stress outcomes may be halted by either changing the environment that produces the stressors or by changing one's thoughts about the event. In brief, "downstream" negative effects of a stressor may be prevented by "upstream" intervention.

Biological/Homeostatic Model

Homeostasis is a word coined by William Cannon. It means a dynamic steady state maintained by internal corrective mechanisms. Hans Selye later used homeostasis in his general adaptation syndrome (GAS) model to explain a disrupted process. There are many basic systems in the body, and one of the most important is anabolism (making biomolecules) and catabolism (breaking down macromolecules) (7). These two processes operate dynamically in the body and the hypothalamus mediates this balance. Anabolism and catabolism occur simultaneously within cells, and are regulated by hormones (8). Many hormones are regulated by the autonomic nervous system originating in the hypothalamus. The sympathetic nervous system (SNS) promotes catabolism, and the parasympathetic nervous system (PNS) promotes anabolism. Hormones released in stress reactions include epinephrine (E), norepinephrine (NE), and cortisol (C); these are released from the adrenal gland and tend to offset the effects of insulin released from the beta cells of the pancreas (6). Continual release of stress hormones or SNS discharge may upset a homeostatic balance between two opposing processes. Everyone who is ill has an accompanying physiological and psychological imbalance (2). The following diagram indicates systems and organs in the body where a chain of events in stress occurs:

Stress Disrupts the Balance in Each Part of a Hierarchy of Control Mechanisms

Homeostasis (an overarching process)



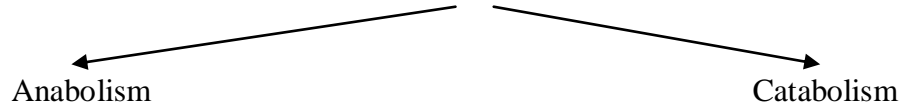
Hypothalamus → PNS/SNS → Endocrine System → Cellular Changes

Each component of this model may be visually represented to illustrate two fundamental processes in dynamic balance. If one process is overly active, a state of disequilibrium may result and homeostasis may be destroyed. In addition to showing a potential for imbalance, the following four models may serve as mental models that mirror real physiological processes in the body.

Visual imagery has been used in medicine to combat such diseases as cancer (6). The idea is that mentally picturing balance in one's mind's eye affects the body—focusing on a thought can create a reaction to that thought (9). Moreover, mental models are likely to influence behavior and thinking (10). Thinking is believed to occur when one concept is compared or contrasted with another one (11). Hence visualizing both sides of an equilibrium enhances thoughts toward maintaining that balance. Physiological processes in balance are likely to promote good health. The four models are:

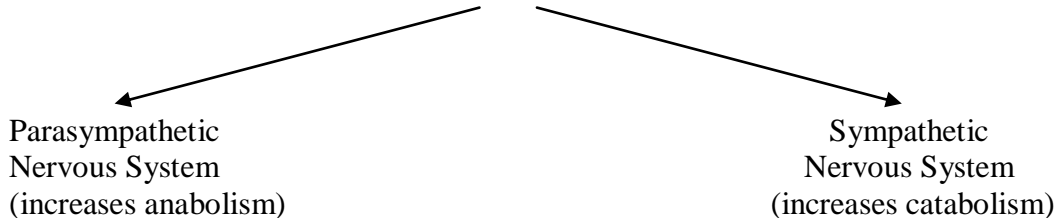
Homeostasis

(two processes operating in dynamic equilibrium)



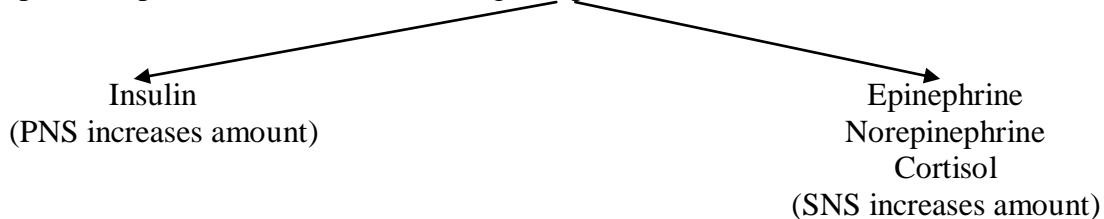
Hypothalamus

(one function is maintaining homeostasis)



Endocrine System

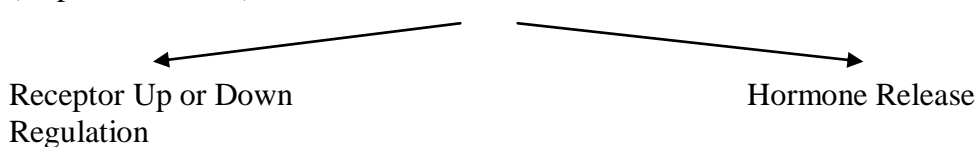
(pancreas produces insulin & adrenal gland produces E, NE, C)



In a fight or flight response, the hypothalamus increases SNS activity and decreases PNS activity. The result is that E, NE, and C blood levels increase and insulin levels decrease.

Body Cell

(response to stress)



Stress is mediated by the interaction of released hormones and cell receptors; both the amount of released hormone and concentration of receptors determine a cell's response to stress. Receptor synthesis increases with the demands of the environment or decreases during negative feedback loops (12). Endocrine diseases such as diabetes demonstrate an imbalance between receptor number and function and release of hormones such as insulin and glucagon. A cell's metabolic need for glucose is unmet. Exercise is recommended for diabetics for the purpose of losing weight and mediating hormone/receptor interaction.

CONCEPTS IN STRESS

Definition of Stress

The word stress comes from the mechanical concept of stress and strain. A material is stressed when it is stretched. It is strained when it no longer returns to its original shape. Human beings are constantly being challenged to adapt to changing circumstances. The concept of stress is ubiquitous, but may be usefully defined as anything that causes physical or emotional damage if not relieved. Detrimental effects occur when the magnitude, the number, and frequency of problems outstrip the ability of the individual to deal with them. There are two main classes of stress (5):

1. Eustress is anything that challenges the body in a positive manner; for example athletic competition. In the hierarchy of systems feedback communication is balanced and coordinated. Goals of body conditioning may be realized.
2. Distress is any stressor that places negative stress on the body that tends to disrupt communication pathways among systems. A good example is emotional stress produced by human relationships. An individual's goal of eliciting support from friends may be frustrated.

Fight or Flight Response

The alarm reaction relates to an automatic response in which a person does not have time to think. Evading a tiger is one example of an instinctive reaction to a real danger. The hypothalamus simultaneously stimulates the SNS to a mass discharge producing increased oxygen and glucose available for use to muscles prepared for rapid movement and sympathetic stimulation of the adrenal medulla to supplement the overall effects of the SNS by discharge of epinephrine and norepinephrine. The heartbeat, respiratory rate, and blood pressure increase to deliver oxygen and glucose to muscles. Normally when the stressful situation is finished, the hormonal levels of epinephrine and norepinephrine decrease and survival emotions such as anger decrease. Students should be aware of their automatic reactions and attempt to control anger (e.g. counting to ten) to avoid disrupting human relationships. In modern society, many stressors do not require an ancient caveman reaction to be effectively managed.

Chronic Stress Response

When short-term stress continues unabated, stress is stored in the body (15). The information inputs from the cerebral cortex and limbic system continue to override feedback impulses from the body that normally reduce the production of cortisol from the adrenal cortex. Endorphins are released from the hypothalamus in stress reactions and authorities believe that people may become addicted to the morphine-like pain-killing effects of it; hence addicted to stress.

Stages of Stress

It is also useful to divide stress into the categories of immediate, intermediate, and chronic stress. In Hans Selye's stress response or general adaptation syndrome (GAS) immediate stress is associated with the alarm or fight or flight stage. Chronic stress is associated with the resistance stage of the GAS (3).

Physiological time-related body reactions may be divided into these three stages:

1. Alarm stage (first few minutes) – sympathetic nervous system (SNS) arousal producing discharge of neural impulses and release of epinephrine and norepinephrine by the adrenal medulla.
2. Intermediate response stage (hours) – emotional responses: anger, upset, frustrated, argumentative—produced in part by the effects of epinephrine and norepinephrine.
3. Chronic stage (days)—cortisol is released by the adrenal cortex producing organ damage over the long run. Emotional reactions include worry, guilt, depression, insomnia, and fatigue.

Presenting stages in stress may enable students to identify early signs of stress and make changes in behavior or thinking before negative physiological or behavior events occur. It is important that the students be informed about the physical reactions of the body under stress to help them connect emotional/behavioral symptoms to the body's chemical balances.

The hormonal responses related to Selye's three progressive stages of distress (13) should now be discussed. These three stages should be compared with three phases of conditioning in exercise. A comparison might be:

Distress Progression

Fight or Flight response → (epinephrine/norepinephrine)	Adaption → (cortisol)	Exhaustion (hormone & protein depletion)
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Eustress Progression (exercise)

<u>0 to 10 Minutes</u>	<u>10 Minutes to Hours</u>	<u>Weeks/Months</u>
Glycogen Consumption	Fat Consumption	Cellular Changes
epinephrine/norepinephrine	cortisol, growth hormone	increased protein, balance in hormone receptors

Distress tends to result in feelings of irritability or depression. Conversely exercise may lead to feeling relaxed and positive. Relating the physiological condition outcomes in distress and eustress to thoughts and feelings will demonstrate to students the mind body connection as shown in the model:

Events → Thoughts → Feelings --> Physiological body changes

IMPLEMENTING THE CURRICULUM UNIT

General strategy

One way to engage students is to ask their opinion about an issue and possible solutions to a problem. The film clips from the movie *The Outsiders* (14) may be shown to help begin a discussion about stress and problem solving. The tone of the class should be “let’s investigate this topic together.” No one is an “expert.” I have found that teenagers gain a sense of ownership if they are not given information; rather they are given the tools and guidance to find the answers themselves. Although there are a host of sources of stress, I believe that when a teenager learns to reduce stress in relationships they may deal with other issues effectively. Therefore a teacher should spend some time talking about parent and peer relationships. The facilitator may use the results of the Franklin Covey mission builder instrument (17) as a basis for discussions. Care should be taken to maintain confidentiality. Hence, individual information should remain anonymous when pooling data.

Connecting Mentally and Emotionally

A teacher may present the systems model of disease to students. I believe that models help students connect with abstract physiological and psychological events and processes. An example of a disruption in a system at the top of a hierarchy of systems disease model might begin with the September 11, 2001 terrorism attack in New York City. An instructor should ask students how they felt the effects of this event in their own lives; this brief discussion may form the basis to introduce the model itself. Students will need to be introduced to relevant stress vocabulary, since people think using concepts and vocabulary, and take actions based on thoughts. When models and terminology have been understood, case study analyses may be done by students in groups. Students may use the Internet to investigate students initiating school shootings such as Columbine High School or Gutenberg High School in Erfurt.

Connecting Physically

Students should become acquainted with stress on a physical level. One way to begin is to ask students to measure the time it takes them to climb up and down a staircase at least 30 feet in vertical length two times. Before beginning they should measure their pulse and respiration rates. Participant's power in performing the exercise may be computed using the equation (4):

$$\text{Power} = \text{Mass} \times \text{Acceleration due to Gravity} \times \text{Height} / \text{Time} .$$

After the activity the respiration and pulse rates should be measured again. The teacher may comment that the SNS caused the increased pulse and respiration rates to provide energy and oxygen for working muscles. This activity may be viewed as eustress. Distress should now be discussed. A teacher should emphasize that in both eustress and distress, pulse and respiration rates and blood pressure may increase. The difference between the two is that movement in eustress may improve general health and well being; while in distress, however, cellular changes leading to illness may occur if the stressor is not removed. Students should be allowed to choose to participate. I generally allow teenagers to choose someone from their group to represent them.

The Importance of Relationships in Maintaining Mental and Physical Balance

To many people, relationships produce the majority of stress, and at the same time everyone needs social support to deal with stressful circumstances. Conflict resolution and communication techniques may be explored. Role-playing activities may promote participation and interest (2). Making a game out of the activity also elicits participation. A good reading source is *Stress in Relationships* from M.C. Orman's book *The 14 Day Stress Cure* (15). I have discovered that students respond positively if asked the question "Think of a problem that you and your parents view differently and propose a different solution." After a discussion about parent/teenager conflicts, students should answer questions on a life events stress questionnaire (16) (2). Class members should also construct a mission statement (16). The assignment for students would be to administer both instruments to their parents. The idea is that understanding similarities and differences between student/parent stresses and goals in life may lead to better communication between the two.

STRESS CURRICULUM UNIT MODEL

Stressor → *Mind / Emotions* → *Physiological/Behavioral Response* → *Environmental Change*

This model of the progression of events in a stress reaction may be used to give students a structure to build upon in understanding the following four lessons. Each one of the four parts in the model will be discussed in succeeding lessons.

Lesson Plan One: Stressors

Objective

Define a stressor and learn curriculum vocabulary.

Activities

Selected parts of the movie *The Outsiders* should be shown. In groups of four, students will brainstorm to answer the questions:

1. What was the source of pressure or stress leading to the actions depicted ?
2. What were the characters feeling?
3. How could the actors have handled their feelings differently?

Each group should present their results and a summary for all groups should be written on the board. The teacher may then explain the overall model for stress, and introduce the essential vocabulary such as: stress, stressor, eustress, distress, fight/flight response, homeostasis, hormones, and physiology. The mathematical models of stress, strain, and may be used to help students connect with the concepts in the unit.

The coordinator should distinguish between internal and external stressors. Internal stress results when one puts pressure on oneself to meet unrealistic goals or holds unrealistic expectations of others. Underlying one's goals or expectations are one's values and beliefs. Sources of external stress include a learning environment, a living situation, a job, or finances. Both internal and external stressors impact the mind and emotions. A common factor in both types of stressors is relationships with others. Authorities believe that conflicts with others may be reduced by knowing and following the values one chooses in interacting with others and living one's life (18).

Lesson Plan Two: Mind/Emotions

Objectives

Understand that individuals vary in their reactions to different stressors and that the appraisal of an event affects behavioral and physiological responses.

Activities

The teacher may begin by asking an open-ended question such as, "What recent events made you feel stressed out?" Events such as September 11, 2001 or Columbine may be mentioned to trigger a response. In groups students may answer questions such as:

1. What were you thinking about at the time?
2. How did your thoughts support the feelings you had that followed?
3. What should you do about your feelings?

The purpose of this activity is to make students aware that people react differently to the same event and their feelings are connected with the way they process information. The idea that one may not be able to change one's circumstances, but may control the manner in which one responds should be proposed. The environmental and psychological models should be presented. Students should discuss ways that stress may be prevented by upstream interventions. The life events and mission statement instruments should be administered and students should keep personal results in their notebooks. The life events questionnaire may indicate sources of external stress. A coordinator may ask students if they agree that life events listed in the questionnaire cause them to feel stress. A teacher should complete the mission statement questionnaire before administering it to students.

Each part of the instrument should be explained to students before they write their responses. An instructor should help them write a mission statement. A mission statement relates to internal sources of stress. Students should be informed that their reactions to stressors and appraisal of events are mediated by their values and beliefs.

Lesson Plan Three: Physiological/Behavioral Responses

Objectives

Explain the concepts homeostasis and fight/flight response. State that the fight/flight response may cause an imbalance in body processes and disturb homeostasis. Understand how the body reacts to stressors and how one's feelings are affected. State ways to combat stress by physical conditioning.

Activities

Students should do the staircase walking activity. The teacher should ask students how the body responded to meet the challenge of moving rapidly. A follow-up question might be "Would exercising each day help to reduce stress?" The teacher may introduce the Biological/Homeostatic model and say that a fight/flight response triggers a SNS response that may lead to an imbalance that disrupts homeostasis. The stages of stress may also be discussed. Groups of students should be asked the question, "Are there good and bad kinds of stress?" Afterwards the teacher may write the stages in the progression of distress or eustress. It is important that students make the connection between the physiological state of their bodies and their feeling and thinking. Students may brainstorm in groups about ways to improve general health by exercise, diet, rest and diversions. I have discovered that high school students know many healthy ways to reduce their stress levels.

Lesson Plan Four: Changing the Environment

Objectives

Identify the sources of external stress. Choose a problem-solving strategy to change the effect of external factors on internal, psychological, and physical processes.

Introduction

To many people, relationships provide a good deal of stress. Two people may think and feel differently about an interaction because they have different values, beliefs, and experiences. A facilitator should make use of the results of the mission builder instrument to demonstrate to students an underlying basis for disagreements.

Activities

Students may be asked the question, "What are some issues that you and your parents view differently and propose different solutions?" I have found that teenagers have strong reactions to this question. I believe that the reason is that teenagers are in the process of developing their own value systems and identities. Hence, a teacher might lead a

discussion about how different goals and stressors that interfere with achieving these aims could lead to conflict. Students may role-play a discussion between a parent and child. Afterwards, the students may brainstorm about different ways to manage the engagement. Methods such as negotiation, and conflict resolution should be presented by the teacher. A teacher/student resource might be *The 14 Day Stress Cure* (15). To gain an understanding of their parents' point-of-view, students should discuss differences between parent and student stressors and objectives in life.

Extended Activity

Values tend to form a basis for attitudes and behaviors. Stress in relationships may result when a person embraces temporal values which do not follow more enduring values. Temporal values include appearance, material possessions, and status. Examples of enduring values include trust, honesty, fairness, and integrity, and faith in God. The facilitator may ask students to compare enduring values to temporal values. A question might be "Which set of values would you prefer to base a relationship with someone. The point should be made that temporal values may change over time, but enduring values are not time dependent. A teacher might mention that one strategy to demonstrate enduring values and improve relationships is to always fulfill pledges made to others.

Enrichment Activities

Objective

To offer interested students a plan to use physical conditioning as a stress management technique.

Activities

Participants should maintain a journal to record stressful times. Each stressful event should be assigned a number (1-10) to indicate the intensity of stress felt. These questions should be answered:

1. What is stressing me?
2. How do I feel?
3. How may I manage my feelings? (e.g., changing the way I view the event, communicate my needs, change the environment)

Simultaneously students should engage in a six-week conditioning program to improve their health. Coaches at school should record baseline measurements of physical condition, plan exercise programs, and assess changes in performance. At the end of the period, a participant should plot the average intensity of all stressful events during a day against each day in the 42-day period. A pattern may be observed in the graph to compare with the results of physical conditioning.

APPENDIX: Definition of Terms

(1) (2) (3) (7)

Appraisal: the process of ascertaining whether one's well-being is at risk, and determining the coping options available to deal with the situation

Stress: the tension felt when demands exceed his/her ability to cope

Stress reaction- an emotional or physical disruption related to an imbalance in body functioning

Stressor- an external stimulus that triggers a stress response

Eustress- positive stress due to exciting challenges

Distress- negative stress due to high demands or fear

Stress coping- attempts to deal with a stress response by taking action or looking at the event in a different way

Physiology- the study of the function of cells, organs, and body systems

Fight/flight response- a short-term emergency response for survival

Homeostasis- a state of dynamic equilibrium in the body and maintenance of a steady state conducive to health

Sympathetic nervous system- prepares the body to meet the challenges of stress; the endocrine glands are stimulated in a stress response

Parasympathetic nervous system- brings the body back into a relaxed state after a stress response

Hormone- a secretion of an endocrine gland that speeds up or slows down a cell function

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www.byu.edu/~psychweb/bnc/ab/ab-n5.htm.
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<http://www.kaiserpermanente.org/locations/california/mod34/mod34-03.html>.
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- (18) Ryder, Verdene. *Home and Family Living*. 3rd ed. Bellaire, Tex.: Datapress, 1976.
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Teacher Resources

<http://www.byu.edu/~psychweb/bnc/ab/ab-n5.htm>

Abnormal Psychology: Stress Processes.

A teacher may gain a clear understanding of stress processes by reading this article.

Biddulph, Steve. *Raising Boys*. Berkeley, Calif.: Celestial Arts, 1998.

Provides insight into the developmental stages of boys, behaviors at each stage, and teaching approaches.

Dacey, John S. and Lisa B. Fiore. *Your Anxious Child*. San Francisco: Jossey-Bass Publishers, 2000.

This book is an excellent resource for teachers and parents to find activities to help children understand and alleviate anxiety.

Luckman, Joan and Karen C. Sorensen. *Medical-Surgical Nursing*. Philadelphia: W.B. Saunders Company, 1980.

An excellent textbook that explains the biological and psychological bases of a stress response. A teacher will find a stress questionnaire in this book.

McNamara, Sarah. *Stress in Young People*. New York: Continuum, 2000.

A comprehensive book describing the nature of stress, techniques to engage teenagers in discussions about stress, and stress management methods. This work is a good up-to-date resource for teachers wishing to help students deal with many of their issues.

<http://tc.unl.edu/stress/resources.html>

Sime, Wes E. *Class Resources*.

A basic resource for gaining an understanding of many aspects of stress.

Tortora, Gerard J. and Sandra R. Grabowski. *Principles of Anatomy and Physiology*. New York: HarperCollins College Publishers, 1996.

Chapters in this textbook describe the physiology of stress and a stress fight/flight response. A good source of information about the biology of stress.

Student Resources

<http://www.cnn.com/2001/US/03/08/violence.survey/index.html>

Arce, Rose. "Study: Kids rate bullying and teasing as 'big problem'."

This article documents young peoples' viewpoints on problems at school. Links provided at the conclusion of the article lead to other sites about school violence.

<http://www.teachhealth.com>

Burns, Steve and Kimberly. *Health Education, Anxiety, Stress, Depression, Drug Use*.

A resource for a life events stress questionnaire. The article discusses stress in understandable terms.

<http://www.franklincovey.com/missionbuilder>

Covey, Franklin, *Franklin Covey-Effectiveness Zone-Mission Builder*.

A structured procedure to list one's values, principles, and significant others. From this information a mission statement (goals) may be written. A valuable resource for gaining self-awareness.

<http://www.stresscure.com/14dycure/chapt10.html>.

Orman, M.C., *Day 10: Stress in Relationships*.

Students will learn about methods to communicate clearly with others through reading this article.