SCIENTIFIC AMERICAN FRONTIERS

TEACHING GUIDE

www.pbs.org/saf/1310

Worried Sick

Activity 2: Grades 5-8

Watch Your Pressure

As you have learned in the *Scientific American Frontiers* segment "Just Relax," stressful situations result in a variety of body changes. The changes associated with the "fight or flight" response are products of increased blood levels of the hormone, adrenaline (a.k.a. epinephrine). This chemical messenger produces several body changes including elevated blood pressure and increased pulse rate. These actions increase blood flow and, along with increased circulation to arms and legs, allow an animal to increase appropriate physical exertion capabilities.

This activity page will offer:

- Insight into understanding blood pressure
- An exploration of how stress may affect blood pressure
- An opportunity to better understand stressful situations

Stressful Increase

In this activity, you'll learn how to take and interpret blood pressure. You'll also explore how thinking about a stressful situation may elevate these parameters. Since we'll be using over-the-counter measuring devices, the pressures won't be continually monitored. Instead, you'll have to take separate and distinct measurements following the changing mental state of the subject.

Materials

- Digital blood pressure measuring device

Teacher Note: Prior to the activity, demonstrate the proper use of the blood pressure measuring instrument. Remind students not to deviate from the demonstrated steps as they obtain blood pressure and pulse data from other students.

Steps

1. Work with a partner. Discuss the concept of blood pressure. Access the URLs cited above to learn more about systolic (beating) pressure and diastolic (resting) pressure.
2. Following your teacher's instructions, use your digital blood pressure device to obtain the blood pressure and pulse rate of your partner (the subject). Make sure that the subject understands the procedure and is relaxed about what will happen.
3. Wait a few minutes. During this time, encourage your subject to relax even more. Discuss restful images. Have the subject close his/her eyes and recite the word "calm." Encourage them to deep breathe and relax as much as they can.
4. Take another blood pressure reading and pulse rate. Record these values.
5. Now, for the next few minutes, have the subject think of a stressful situation. Discuss the situation with the subject. Encourage the subject to discuss the stressful emotions associated with this event.
6. Obtain another blood pressure reading and pulse rate. Record these values.
7. Exchange roles and repeat steps 3 through 6.

Questions

1. What do the two numbers represent in blood pressure readings?
2. Do any of the mood role-playing events affect blood pressure and pulse rates? If so, explain.
3. Was there a significant (and repeatable) change in blood pressure and/or pulse rate following the relaxation and stressful periods? If so, explain.

Daily Extension

Do you think that your stress levels change during the day? If so, how? Then, create an experimental design that might explore daily (and repeatable) fluctuations in blood pressure and pulse. Share your design with your teacher. With his/her permission perform the inquiry and share your results with classmates.

No More Tests!

Stress chemicals may interfere with the effectiveness of thinking. In fact some educational specialists believe that the stressful situation of "testing" is counterproductive to learning. What do you think? Are tests essential to learning or does the anxiety associated with exam-taking compromise their value? Think of it another way. Would you prefer going to a physician who scored well on the medical licensing exams or one who never had to take these qualifying tests?

Playful Communication

Write a stage play in which a person (you) have a dialogue with an actor who

represents the concept of Stress Use what you've learned in this show to help shape and the character of Stress. The dialogue should explore the intimate and dynamic relationship that an individual has with this emotional state. With a partner, perform this play for your classmates as a staged reading.

Mood and Digestion

The release of the fight-or-flight chemical affects more than just blood pressure and pulse rate. It can also change the way in which you digest food. As scientists learn more about the intimate connection between mind and body, we are appreciating how moods affect health. Want to learn more about healthy living and the link between mood and digestion? Check out the following **Link**: *http://www.ahealthyme.com/article/primer/101186767*

Increased Learning and Fight-or-Flight

When your body is under the stress of fight-or-flight, neurotransmitters flood the brain. These chemicals accelerate the rate at which new memories are constructed. Think about it. What is the advantage of an increasing the richness of this memory during stressful times that elicit this response?

Web Connection

Blood Pressure

http://www.americanheart.org/presenter.jhtml?identifier=4473

An American Heart Association site that includes a good deal of information on blood pressure. It also contains a search engine for locating articles on blood pressure.

Epinephrine

http://www.wikipedia.org/wiki/Adrenaline

A richly hyperlinked primer on the fight-or-flight hormone, epinephrine (AKA adrenaline)

Stress Management

http://www.plainsense.com/Health/Stress/index.htm

An interactive primer on stress and stress management

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Watch Your Pressure

Questions

1. What do the two numbers represent in blood pressure readings?
   (The first number called the systolic pressure identifies the pressure associated with the contraction of the heart. The second number known as the diastolic pressure identifies the "resting" pressure in the vessel during a time when the heart is not contracting.)
2. Do any of the mood role-playing events affect blood pressure and pulse rates? If so, explain.
   (Accept all reasonable responses)
3. Was there a significant (and repeatable) change in blood pressure and/or pulse rate following the relaxation and stressful periods? If so, explain.
   (Accept all reasonable responses)

CURRICULUM LINKS

Life Science :

Blood pressure

Effect of stress on blood pressure

Effect of stress on digestive system

Effect of stress on nervous system

Technology :

Use of a digital tool that monitors blood pressures

NATIONAL SCIENCE STANDARDS (Grades 5-8)

Science as Inquiry- Content Standard A

Students will design and conduct a scientific investigation.

Students will use digital tools to collect data.

Students will explore cause and effect relationships by analyzing data.

Life Science - Content Standard C

Students will learn about interactions between the nervous and circulatory systems.

Students will investigate interactions between the nervous and immune systems.

Students will study the structure and function of the circulatory system.

Students will discuss an organisms behavioral response to external stimuli.