HANOVER WELLNESS EDUCATION NEWS

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Sarcopenia

Sarcopenia (Sar-co-PEE-nee-ah) is the age-related loss of muscle mass, strength and function.

Sarcopenia generally begins around age 45, when muscle mass begins to decline at a rate of about 1% a year. As muscle mass decreases, so does muscle strength. As strength declines, so does physical functioning—the ability to climb stairs, do chores, dance, take walks, enjoy a day of physical activity, go shopping and so forth.

As your lean muscle begins to erode, your body begins to weaken… as your body begins to weaken you lose your ability to exercise… as you fail to exercise, your lean muscle through a lack of use, further erodes and your body becomes even weaker.

If left unchecked, this ongoing depletion of your lean muscle, strength and ability to exercise leads to a dramatic decrease in your body's metabolism (Stryer, 1997; Bogardus, 1990). Over time as the energy you consume becomes greater than the energy you require, your body begins to store the surplus, as excess body fat (Hill, 1987).

The muscle loss occurs in people of all fitness levels, even master athletes. But those who have less muscle to begin with pay a higher price. Women in particular face risks from lost muscle mass. After adolescence, “women have about one third less muscle mass than men,” says Miriam Nelson, PhD, director of the Center for Physical Activity and Nutrition at Tufts University. “So their muscle loss has an impact sooner. More women end up in nursing homes. Also, women live longer—so they’re older but much weaker,” she explains.

What causes sarcopenia? Some believe it’s caused by a gradual loss of certain nerve cells that link the brain to the muscles; in turn, loss of chemical connections between the two causes a loss of muscle cells themselves. Other age-related declines may play into it as well. For instance, the immune system gradually weakens, and that, some researchers suggest, may increase levels of substances that break down muscle. In addition, levels of hormones that stimulate muscle growth—estrogen, testosterone, and growth hormone—fall with age.

Sedentary behavior is also a contributor to sarcopenia. The loss of strength from sarcopenia can create a vicious cycle. When it takes a great deal of physical effort to perform daily tasks, people naturally shy away from doing them to avoid discomfort. But since activity, no matter how limited, helps to maintain muscle mass, abandoning one’s efforts only serves to speed up muscle loss—creating more weakness still.

Stay Strong

It has been well known that strength training increases muscle mass and strength in young adults, many thought whatever muscle loss occurred in older people was inevitable. Part of the problem was

the belief that for older people to lift weights was strange, if not harmful. Researchers have found that people in their 90s can build muscle and strength.

Strength training

More people take part in aerobic activity for exercise rather than strength training. Incorporating a walk into the day doesn't take much planning, and other aerobic activities like cycling, jogging, or swimming are things you already know how to do and already enjoy. For less than an hour and a half of strength training a week—about 40 minutes a session—you can receive great benefits.

Aerobic exercise, while it strengthens the heart and lungs, isn't sufficient by itself to hold back sarcopenia. A study from Denmark illustrates the point - Men in their late 60s who'd lifted weights regularly for years had muscle mass similar to that of non-athletes in their 20s. But older runners and swimmers didn't, even though they'd trained for years, too. Running and swimming did not prevent sarcopenia.

Strength training has many benefits, providing not just muscle but also the vigor that goes with being stronger. It's not surprising when you consider that it can maintain or improve an older person's ability to perform so many activities important to daily life, such as climbing stairs, walking faster, or maintaining balance when on slippery footing. These things are essential for someone who wants to continue living independently.

Building muscle creates a positive cycle in people of any age. The better and stronger you feel, the more likely you are to stay active and do things you enjoy—gardening, playing tennis, and the like. The more active you are, in turn, the more you'll keep weakness at bay.

Preserving muscle mass can also impact your ability to withstand disease. When you're sick, the body burns protein faster than usual, pulling protein components from the muscles and delivering them to the immune system, liver, and other organs for use in healing wounds and building the antibodies and white blood cells needed to fight illness. If the muscle protein "reservoir" has already been depleted by sarcopenia, there's that much less ammunition available.

Research is beginning to show that along with strength training, particular nutrients may play a role in slowing the advance of sarcopenia. One of them is protein. The body has to make up everyday protein losses from skin, nails, hair, sweat, and body fluids. If your daily protein intake isn't enough, the body uses muscle as a resource for amino acids—the building blocks of protein. Poor protein intake doesn't just contribute to muscle loss from within. It also won't allow for proper muscle maintenance—there's not enough building material there to work with.

The idea that a chronic lack of protein could be drawing down muscle reservoirs in older people makes sense, especially when you consider that many are eating less protein than they should be. An estimated one in three people over 60 eats less than the current recommendation of 0.36 grams of protein per pound of body weight, or 54 grams a day for a 150-pound person. Some research even suggests that older people need more. Experts are still debating what the "right" protein number for older adults should be. Make sure you're getting at least the current recommended amount.

Testing for sarcopenia requires methods that are performed in the research laboratory, not the doctor's office. But if you want a reasonable indication, says Ronenn Roubenoff, MD, associate professor of medicine and nutrition at Tufts University, visit a registered dietitian. She or he can measure skinfold thickness and arm and leg circumference to determine a person's approximate

muscle mass and compare it to national standards. Falling below the 50th percentile for age is a good indication that a person has sarcopenia.

The content of this newsletter is NOT meant to provide anyone with personal medical advice which you should obtain from your health care provider.

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HANOVER WELLNESS EDUCATION NEWS

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What is a whole grain food?

Whole grains, as well as foods made from them, consist of the entire grain seed, usually called the kernel. This kernel is made of three parts: the bran, germ and endosperm (see definitions). If the kernel has been cracked, crushed or flaked then it must retain nearly the same relative proportions of bran, germ and endosperm as the original grain to be called whole grain. In the grain refining process, most of the bran and some of the germ is removed, resulting in the loss of dietary fiber (also known as cereal fiber), vitamins, minerals, lignans, phytoestrogens, phenolic compounds, and phytic acid. Some manufacturers add bran to grain products to increase the dietary fiber content.

The recommended fiber intake is 14 grams per 1,000 calories (USDA, 2005)

Whole grains include whole wheat flour, cracked wheat, graham flour, brown rice, oats and cornmeal. To be considered a food containing a whole grain, a commercially produced food item would have a whole grain listed as the first ingredient on the product's nutrition label (it must have >=51% whole grain by weight). Wheat flour, enriched flour and degerminated cornmeal are **NOT** whole grains. The 2005 Dietary Guidelines for Americans (USDA) recommends that at least half of an individual's recommended grain servings should be whole grains. Whole grains include (look on the ingredients for one of these to be first on the list): whole grain barley/barley, brown rice, amaranth, buckwheat, bulgur (cracked wheat), whole grain corn, flaxseed, millet, whole oats/oats, quinoa, whole rye/rye, teff, triticale (a hybrid of wheat and rye), whole wheat, popcorn, sorghum and wheat berries.

For many whole grain products the words whole or whole grain will appear before the grain ingredients name. Consuming these choices offers protection against diabetes, heart disease, cancer and gastrointestinal problems such as diverticulosis (development of tiny easily irritated pouches inside the colon) and constipation. Consuming highly refined (rapidly digested and absorbed) carbohydrates increases levels of blood sugar (see July, 2007 Wellness Education News for more on the blood sugar roller coaster) and insulin, raises levels of triglycerides and lowers HDL cholesterol. These changes can lead to cardiovascular disease and diabetes. Whole grains make you feel full faster aiding in weight control (USDA Dietary guidelines for Americans, 2005).

When grains are refined to make white flour, the germ and the bran portions are removed, leaving the endosperm. This process removes most nutrient dense portions of the grain. Refined products are often "enriched". This means B vitamins (niacin, thiamin, folic acid and riboflavin) and iron are added back. Whole grain products contain the germ, bran and endosperm and all of the nutrients that go with them. Enriched grains often lack soluble and insoluble fiber. Whole grains offer both types of fiber. Insoluble fiber in foods like brown rice, popcorn, and whole grains prevents against colon cancer, constipation and diverticulosis. Soluble fiber in oatmeal, barley and rye helps lower cholesterol, reduces risk of heart disease and stroke and helps slow absorption of glucose, stabilizing blood sugar. Look for a whole grain as the first ingredient and 2 or more grams per serving of dietary fiber on the food label.

Fiber

Dietary fiber is the term for several materials in the parts of plants that your body can't digest. Fruits, vegetables, some whole-grain foods, beans and legumes are all good sources of dietary fiber. Fiber is classified as soluble or insoluble.

When regularly eaten as part of a diet low in saturated fat, trans fat and cholesterol, **soluble fiber** has been shown to help lower blood cholesterol. Foods high in soluble fiber include oat bran, oatmeal, beans, peas, rice bran, barley, citrus fruits, strawberries and apple pulp.

Insoluble fiber is an important aid in normal bowel function. Foods high in insoluble fiber include whole-wheat breads, wheat cereals, wheat bran, cabbage, beets, carrots, brussels sprouts, turnips, cauliflower and apple skin. Many commercial oat bran and wheat bran products (muffins, chips, waffles) actually contain very little bran. They may also be high in sodium, total fat, saturated fat and trans fat. The AHA recommends reading the labels on all packaged foods (American Heart Association, 2007).

Definitions

Bran: is the outer shell of a whole grain kernel that provides a rich source of fiber, trace minerals, phytochemicals, and B vitamins. This part of the grain is usually not present in refined grains.

Carbohydrates: Basic nutrients that supply the body with glucose, the energy form most commonly used to sustain normal activity. Carbohydrates can actually be metabolized more quickly and efficiently than proteins and are a quick source of energy for the body, being easily converted to glucose, the fuel for the body's cells. Carbohydrates play an important role in the functioning of internal organs, the nervous system and the muscles. The carbohydrates that should form the cornerstone of a healthy diet come from whole grains such as brown rice, oats, whole wheat pasta, whole wheat bread or beans. Your body takes longer to digest these foods meaning that they have a slow, low and steady effect on blood sugar and insulin levels, which protects against heart disease and diabetes. Further, they make you feel full longer and give you important fiber plus many vitamins and minerals.

Complex carbohydrates: These are found in grains, cereals, dark grain leafy vegetables, yellow fruits and vegetables, cruciferous vegetables (broccoli, cabbage, cauliflower). These are long chains of linked sugars. The main type of complex carbohydrates is starch, a long chain of glucose molecules. The digestive system can break down complex carbohydrates like starch into their component sugars. Others are quite indigestible and pass largely unchanged through the stomach and the intestines. These carbohydrates, called fiber are an important part of our diet. The USDA – DGA defines complex carbohydrates as large chains of sugar units arranged to form starches and fiber. Complex carbohydrates include vegetables, whole fruits, rice, pasta, potatoes, grains (brown rice, oats, wheat, barley, corn), legumes (chick peas, black eyed peas, lentils, as well as beans such as lima, kidney, pinto, soy and black beans).

Endosperm: This is the largest portion of a grain kernel and contains complex carbohydrates and protein to provide energy.

Fiber: The indigestible portion of plant foods that helps move foods through the digestive system and softens stools by absorbing water. It is often referred to as bulk or roughage -carbohydrate molecules in plant foods that cannot be broken down by human acids and digestive enzymes in the stomach or intestines and are only minimally absorbed and metabolized. These substances that are referred to as fiber include: cellulose, pectin, and gums. There are two classes of fiber: soluble and insoluble. The dietary guidelines for Americans recommends a daily intake of 14 grams of fiber per 1,000 calories. Dietary fiber helps maintain the health of the digestive tract and promotes proper bowel functioning.

Germ: This nourishes grain and is packed with antioxidants, the B vitamins and vitamin E. It is also a source of heart healthy unsaturated fats. The germ is usually not present in refined grains. The germ is one of three parts of a grain kernel (the endosperm and bran are the other two parts)

Insoluble fiber: comes from the cell wall of plants. The main component is cellulose, a long string of glucose molecules attached in a way that we can't separate and that cannot dissolve in the intestine's fluids. By dragging partly digested food slowly through the intestine insoluble fiber delays the absorption of sugars and fats, This helps blunt the spikes in blood sugar and insulin that occur after eating foods that are easily converted into glucose and a similar spike in triglycerides, particles that ferry fat from the intestines to the tissues. High levels of insulin and triglycerides in the blood increase the likelihood of heart attack and the repeated demand for insulin can raise the chance of type A diabetes. Insoluble fiber is found in foods such as brown rice, popcorn, and whole grain breads, pasta and cereal. It helps prevent constipation, hemorrhoids, and diverticulosis. It is also is protective against colon cancer.

Soluble fiber: This is abundant in oats, barley, rye and seeds, dissolves in the intestine's fluids, forming a sticky, viscous, jell-o like mass. This gummy compound traps cholesterol rich bile acids and binds them into stool. The more cholesterol you excrete, the less is available for transfer into the blood, and the lower your serum cholesterol. The lower your cholesterol level, the lower your risk of heart disease and other circulatory problems. Soluble fiber can also slow the absorption of glucose, which is beneficial in stabilizing blood sugar.

Whole grain: Whole grains as well as foods made from them, consist of the entire grain seed, usually called the kernel. This kernel is made of three parts: the bran, germ and endosperm. If the kernel has been cracked, crushed or flaked then it must retain nearly the same relative proportions of bran, germ and endosperm as the original grain to be called whole grain. In the grain refining process, most of the bran and some of the germ is removed, resulting in the loss of dietary fiber (also known as cereal fiber), vitamins, minerals, lignans, phytoestrogens, phenolic compounds, and phytic acid. Some manufacturers add bran to grain products to increase the dietary fiber content. Whole grains include whole wheat flour, cracked wheat, graham flour, brown rice, oats and cornmeal. To be considered a food containing a whole grain, a commercially produced food item would have a whole grain listed as the first ingredient on the product's nutrition label. Wheat flour, enriched flour and degerminated cornmeal are NOT whole grains. The 2005 dietary guidelines for Americans recommend that at least half of an individual's recommended grain servings should be whole grains. Excellent whole grains include (look on the ingredients for one of these to be first on the list): barley/whole grain barley, brown rice, amaranth, buckwheat, bulgur (bulghur – a form of wheat made by boiling kernels of wheat, called wheat berries and crushing them), corn, flaxseed, millet, whole oats/oatmeal, quinoa, whole rye/rye, teff, triticale (a hybrid of wheat and rye),whole wheat, sorghum and wheat berries. For many whole grain products the words whole or whole grain will appear before the grain ingredients name. Consuming these choices offers protection against diabetes, heart disease, cancer and gastrointestinal problems such as diverticulosis (development of tiny easily irritated pouches inside the colon) and constipation. Consuming highly refined (rapidly digested and absorbed) carbohydrates increases levels of blood sugar and insulin, raises levels of triglycerides and lowers HDL cholesterol. These changes can lead to cardiovascular disease and diabetes.

Whole grain food: The USDA-Dietary Guidelines for Americans defines a whole grain food as a food that is made from the entire grain seed, usually called the kernel, which consists of the brain, germ and endosperm. If the kernel has been cracked, crushed or flakes it must retain nearly the same relative proportions of brain, germ and endosperm as the original grain in order to be called whole grain.

The content of this newsletter is NOT meant to provide anyone with personal medical advice which you should obtain from your health care provider.

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HANOVER WELLNESS EDUCATION NEWS

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What are the healthiest grains to eat?

A score has been given for each grain below by totaling its percent of the U.S. recommended daily allowance (RDA) for five nutrients plus fiber. There is no RDA for fiber. The daily value (DV) of 25 grams has been used, which now appears on food labels. For example, a five ounce serving of quinoa has 9 percent of the DV for fiber (9 points), and 20 percent of the RDA for magnesium (20 points), 4 percent for vitamin B_6 (4 points), 8 percent for zinc (8 points), 14 percent for copper (14 points), and 18 percent for iron (18 points). The score for quinoa is 78 points. Pastas have been included for comparison. Grains are ranked from highest to lowest score

Grain (5 ounces, cooked)	Score	Fiber	Magnesium	Vitamin B_6	Zinc	Copper	Iron
Quinoa 1	73	*	+	-	*	+	*
Macaroni or spaghetti, Whole wheat	69	+	+	*	*	+	*
Amaranth 1	66	+	+	-	*	+	+
Buckwheat groats 2	64	+	+	*	*	+	*
Spaghetti, spinach	61	na	+	*	+	+	*
Bulgur	60	+	+	*	*	*	*
Barley, pearled 2	59	+	*	*	*	*	+
Wild rice 2	58	+	+	+	+	*	*
Millet	53	*	+	*	*	+	*
Brown rice	51	+	+	+	*	*	-
Triticale 1	47	+	+	-	*	*	-
Spaghetti	42	+	*	-	*	*	+
Wheat berries 1	41	+	*	-	*	*	*
Macaroni	39	*	*	-	*	*	+
Kamut 1	37	na	+	-	*	*	*
Oats, rolled	33	+	*	-	*	-	*
Spelt 1	33	+	+	na	na	-	*
White rice, converted	26	-	-	-	-	*	*
Couscous, white	23	*	-	-	-	-	-
White rice, instant	18	-	-	-	-	*	*
Soba noodles	12	na	-	-	-	-	-
Corn grits	10	-	-	-	-	-	*

+ = contains at least 10 percent of the USRDA
* = contains between 5-9 percent of the USRDA
- = contains less than 5 percent of the USRDA
na = not available
1 score is based on USDA estimate of all nutrients
2 fiber value is a USDA estimate
(Liebman & Hurley, 2003)

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HANOVER WELLNESS EDUCATION NEWS

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What social and emotional skills do students need?

"Your beliefs become your thoughts. Your thoughts become your words. Your words become your activities. Your activities become your habits. Your habits become your values. Your values become your destiny."
Mahatma Ghandi

Social and emotional learning is usually a missing piece of American public education. If it is present, it often comes as a reaction to a problem (i.e., bullying and conflict resolution programs) rather than as a coordinated, comprehensive P-12 program that permeates all instruction.

Today's students need social and emotional skills. They need to be able to: manage their emotions; be respectful and actively involved; motivate themselves; sustain effort and work productively in teams. Social and emotional learning (also known as affective learning and emotional intelligence) is an umbrella term that can include student feelings, interests, emotions, desires, attitudes, appreciations, commitment, will power, dispositions, morals and values (Bloom et al, 1971). These behaviors all influence how learners respond to themselves, the teacher, each other and the learning experiences they participate in.

"*Feelings…cannot be passed along from teacher to learner in the way information is transmitted. Nor can the learner acquire them by pursuing them directly as he might acquire understanding by study. Feelings are almost always the consequence of something – of success, of failure, of duty done or duty ignored, of danger encountered or danger escaped* (Ebel, 1972)."

A student's thoughts and feelings will affect her level of achievement. A child's ability to understand information is affected by his emotional state. The ability to solve problems results from a combination of social and emotional skills and cognitive processes (Damasio, 1994; Elias et al, 1997).

Students decide whether participating and learning are worth the effort. They determine whether they are capable of performing tasks and achieving goals. Each learner has: strengths and weaknesses; unique interests, motivation and learning style; a voice that needs to be heard; and the capacity to make decisions (Hellison, 2003). Further, those who personify the social and emotional skills we desire most and model them for children are more likely to develop those competencies.

Many have attempted to organize feelings and emotions into a framework. Hellison (2003) created a framework for teaching students personal and social responsibility through physical activity. Gardner (1983) described intrapersonal (self knowledge – accessing, identifying and drawing upon feelings to guide behavior) and interpersonal (identify and respond appropriately to temperaments and desires of others) intelligence. Emotional intelligence represents a set of emotional competencies (Salovey & Mayer, 1990; Goleman, 1995; Bar-On, 1997; Mayer & Salovey, 1997;). It represents the ability to recognize one's emotional responses, and those of others, and use this knowledge in effective ways (Goleman, 1995). Lastly, social emotional learning (SEL) is used successfully in many schools (Zins et al, 2004) in the U.S. SEL helps develop self-awareness, self-management, social awareness, responsible decision-making, and relationship management (Elias et al, 1997).

LIFE SKILLS

Two reports have identified many essential affective competencies. The 1991 report by the Secretary's Commission on Achieving Necessary Skills (SCANS) titled What Work Requires of Schools: A SCANS Report for America 2000 identifies: responsibility, self-esteem, sociability, self-management, and integrity/honesty. The report, First Things First: What Americans Expect from Public Schools (Farkas, Friedman, Boese, & Shaw, 1994), stated that schools should develop the learner's self-discipline, punctuality, and dependability.

The following affective competencies come from a blending of expert opinion (Farkas et al, 1994; Goleman, 1995; Mayer and Salovey, 1997; and SCANS, 1991) on the social and emotional skills that students will need for the future.

Self awareness (managing emotions)

1. Identify and express a feeling and/or emotion
2. Express needs in a respectful manner
3. Perceive the causes and consequences of emotions
4. Be open to both pleasant and unpleasant feelings

Self-management

1. Shed anxiety, anger, sadness, and/or feelings of failure
2. Show respect for self, others and the learning environment
3. Be actively involved in learning and willing to try new things
4. Know when and how to ask for help
5. Accept responsibility for what she/he does or fails to do

Self-motivation

1. Be able to defer gratification
2. Identify needs and interests
3. Be capable of integrating new information into one's life
4. Maintain focus and on task behavior
5. Modify performance in light of feedback
6. Put motivation into action in order to achieve a goal

Social awareness

1. Identify, understand and be responsive to social signals that indicate what others want or need
2. Understand that individual and group differences complement each other
3. Demonstrate concern, support and responsiveness toward others.

Relationship management

1. Cooperate, interact smoothly with people with diverse cultural, ethnic and social backgrounds
2. Contribute toward a group goal with ideas and effort
3. Help manage emotions in others
4. Listen attentively
5. Respond to corrective feedback unemotionally and non defensively
6. Achieve mutually satisfactory and respectful resolutions to conflict
7. Resist negative peer pressure and refuse appropriately and assertively
8. Verbally exchange ideas, feelings and concepts appropriately with others
9. Give and receive help, feedback and criticism appropriately

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HANOVER WELLNESS EDUCATION NEWS

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What is the relationship between physical activity and learning?

"From your genes to your emotions, your body and your brain are dying to embrace the physical life." Dr. John J. Ratey, Harvard Medical School.

Dr. John Ratey is a clinical associate professor of psychiatry at Harvard Medical School. He is the author or co-author of eight books most notably, *Driven to Distraction* and *A User's Guide to the Brain*. This month's issue of the wellness news explores Dr. John Ratey's latest book, Spark: The revolutionary new science of exercise and the brain. This book shows how physical activity equips your brain to think, remember, plan, solve problems and learn.

In this era of labor saving devices, supersizing/overeating and sedentary lifestyles it's easy to forget that we were born to move. The human capacity to think, plan and learn is rooted in the parts of the brain that govern movement. Physical activity cues the building blocks of learning in the brain. Physical activity also affects mood, anxiety, and attention, guards against stress and reverses some of the effects of aging in the brain.

Many see the brain as unrelated or unconnected to the body. We view it as a remote commander that mysteriously directs the body. However, those who subscribe to these beliefs fail to see that exercise has a profound effect on cognitive abilities. Physical activity creates an environment in which the brain is ready, willing and able to learn.

The brain responds like muscles do, growing with use and shriveling with inactivity. Neurons in the brain connect to each other like leaves on branches. Exercise causes these branches to grow and bloom with new buds, enhancing brain function. If you had an hour of exercise this morning you are in the right frame of mind to read this sentence. Your brain is also better equipped to remember it.

Learning

Physical activity influences learning directly, at a cellular level, improving the brain's potential to store and process new information. Interestingly, only creatures that move have a brain. Further, that which we call thinking is the evolutionary internalization of movement. As our species evolved our physical skills have developed into abstract abilities to predict, sequence, estimate, plan, rehearse, observe ourselves, judge, correct mistakes, change tactics, and remember everything we did in order to survive. The brain circuitry that we once used to start a fire are same ones we use today to reason, remember, solve problems, think, and plan.

Brain anatomy and function

Neuroscientists believe that the cerebellum coordinates motor skills as well as thoughts, attention, emotions and even social skills. When we learn a complex movement (e.g., a dance, a tennis serve, a cartwheel in gymnastics and so forth) we are exercising the same areas of the brain involved in all cognitive functions.

Your body was designed to be physically challenged. When you push your body you challenge your brain as well. Learning and memory have evolved together with the motor functions. As far as you brain is concerned if you are not moving there's no real need to learn anything.

Physical activity helps us learn on three levels:

1. It optimizes alertness, attention, and motivation.
2. It prepares and encourages nerve cells to bind to one another, which is the cellular basis for storing new information.
3. It spurs the development of new cells from stem cells in the hippocampus

Brain anatomy and physiology
The hippocampus receives input from working memory, cross references information with existing memories and bundles information together and sends it to the prefrontal cortex. The prefrontal cortex is the CEO of the brain in charge of executive functions such as accessing working memory, initiating action, judging, planning, predicting and understanding. The prefrontal cortex analyzes information and sequences it. Then it ties everything together. It works with the cerebellum and basal ganglia (which keeps these functions on track by maintaining the rhythm for the exchange of information by the different parts of the brain).

Aerobic activity improves executive function. Learning new and challenging physical activities (which happens every day in physical education) also improves brain function. Aerobic activity and complex physical activities have distinct positive and complementary effects on the brain. Aerobic activity elevates neural transmitters, creates new blood vessels that send growth factors and spawns new cells.

Complex physical activities put all those things to use by strengthening and expanding networks. The more complex the physical activity the more complex the synaptic connections. Even though these brain circuits (pathways) are created by movement they can be recruited by other areas of the brain for thinking. Complex physical activities engage nerve cells throughout the brain. For example, in dance, moving to an irregular rhythm versus a steady, regular rhythm improves brain plasticity (the flexibility or adaptability of the brain). The brain grows stronger in much the same way muscles do through resistance training.

When we are learning a new motor skill the circuits linking the cerebellum, basal ganglia and prefrontal cortex get going and your performance improves. While practicing these types of motor skills we create thicker myelin around nerve fibers. This improves the quality and speed of the signals and the efficiency of brain circuitry.

How much aerobic activity do I need to do to benefit my brain?
Ratey recommends doing some form of aerobic activity six days a week for 45 minutes to an hour. Four of those days should be on the longer side, at moderate intensity, and two of those days on the shorter side with high intensity. Additionally, on the shorter high intensity days, strength training is recommended. These days should not be consecutive since your body and brain need recovery time to grow after high intensity days. Overall, you should dedicate six hours a week to your brain.

Quality physical education, better fitness and daily physical activity means improved academic results
In the spring of 2001, 954,000 fifth, seventh and ninth grade students in California took two tests: the FITNESSGRAM, a physical fitness test that measures health related fitness (i.e., cardiorespiratory endurance, muscular strength and muscular endurance, flexibility and body composition) and the state's standardized test, the Stanford Achievement Test (SAT, 9th edition). Researchers at the

California Department of Education (CDE, 2008) found that students with higher levels of physical fitness scored higher on the state's standardized test at all grade levels than their less fit peers.

The results prompted state superintendent of education, Delaine Eastin to state, "This statewide study provides compelling evidence that the physical well being of students has a direct impact on their ability to achieve academically. We now have the proof we've been looking for: students achieve best when they are physically fit. Thousands of years ago, the Greeks understood the importance of improving spirit, mind and body. The research here validates their philosophic approach with scientific validation (CDE, 2008).

It should be noted that California students in first through sixth grade participate in physical education for 200 minutes every ten days. Students in grades seven through twelve participate in 400 minutes of physical education every ten days.

A high school in Naperville, Illinois has created a daily physical education class called learning readiness physical education. The students at this school took the Trends in International Mathematics and Science Study (TIMMSS) exam and earned the top score in the world in science and finished sixth in world in math. Illinois requires all students to participate in physical education every school day.

The content of this news is NOT intended to provide anyone with personal medical advice, which you should obtain from your health care provider.

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HANOVER WELLNESS EDUCATION NEWS

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What is the relationship between ADHD, physical activity and diet?

Attention Deficit Hyperactivity Disorder (ADHD – previously known as attention deficit disorder) is a neurobehavioral disorder characterized by pervasive inattention and hyperactivity-impulsivity that often results in functional impairment (CDC, 2005). ADHD becomes apparent in some children in the preschool and early school years (NIMH, 2008). It is hard for these children to control their behavior and/or pay attention. It is estimated that between 3 and 5 percent of children have ADHD, or approximately 2 million children in the United States. This means that in a classroom of 25 to 30 children, it is likely that at least one will have ADHD (NIMH, 2008). In Massachusetts about 5.5% of all children ages 4-17 have ADHD (CDC, 2005).

There are three patterns of behavior that indicate ADHD (NIMH, 2008).

1. The predominantly hyperactive-impulsive type
2. The predominantly inattentive type
3. The combined type - displays both inattentive and hyperactive-impulsive symptoms.

Those with ADHD have been described as prisoners of the present. It is difficult for them to defer the achievement of goals so it might seem as if they lack motivation or focus. Dr. John Ratey of Harvard Medical School (2008), an expert in ADHD, suggests seeing ADHD as a continuum and that everyone has a different degree of attention deficit.

ADHD and Diet

More and more evidence is showing that healthy eating plays a vital role in reducing hyperactive behavior. The peer reviewed medical journal the Lancet (McCann et al, 2007) published research that found artificial colors and preservatives promote ADHD. The study stopped short of a cause and effect relationship. However, upon release of the study the United Kingdom promptly recommended that children avoid food additives such as synthetic colors (e.g., FD & C Yellow #5, FD & C Red #3, FD & C Yellow #6, Cochineal, Quinoline yellow, FD & C Red #40, and sodium benzoate – These additives are some of the most common ingredients in packaged foods Winter, 2004). For a thorough discussion of these food additives see Winter, 2004.

Over thirty years ago Dr. Ben Feingold claimed that artificial colors and other food additives (AFCA) negatively affected behavior in children. The main effect of AFCA is to produce overactive, impulsive and inattentive behavior (i.e., hyperactivity). Dr. Feingold's program currently recommends avoiding ALL synthetic/artificial food additives.

In summary, common food additives and colorings can increase hyperactive behavior and decrease attention in a broad range of children, not just for those whom hyperactivity has been diagnosed as a learning problem (McCann et al, 2007). Food additives exacerbate hyperactive behaviors (e.g., inattention, impulsivity and overactivity) at least into middle childhood (McCann et al, 2007; Rosenthal, 2007). Lastly, this study lends more support to a whole food diet (Willett, 2005).

ADHD and Physical Activity

Dr. Ned Hallowell and Dr. John Ratey (1994a, 1994b, 2005; Ratey, 2008) describe ADHD as attention variability disorder; the deficit is one of consistency. They note that inattention is always part of this

disorder and sometimes hyperactivity is present as well. It is called ADHD regardless of whether hyperactivity is involved.

Paradoxically, one of the best treatments for ADHD is rigid structure (Ratey, 2008). Hallowell and Ratey recommend highly structured forms of physical activity such as martial arts, figure skating, gymnastics or dance as benefits to one who has been diagnosed with ADHD.

Generally, the problem for people with ADHD is that their attention system is discontinuous and uncoordinated. The attention system ties in with movement and exercise. The areas of the brain that control physical activity also coordinate the flow of information.

It was once thought that the only function of the cerebellum was to control movement. When we learn a new physical activity such as serve in tennis or a folk dance our cerebellum is working hard. The cerebellum makes up 10% of the brain's volume, but it contains half our neurons, which means it is a densely packed area filled with activity. We now know that the cerebellum also updates and manages the flow of information through the brain. People with ADHD can have parts of their cerebellum that are smaller and don't function properly, causing disjointed attention (Ratey, 2008).

There is a strong relationship between movement and attention. They share overlapping patterns. This is why activities like dance, gymnastics, and martial arts work well for ADHD children. They have to pay attention while learning new movements. This engages and trains both systems. Exercise is a tool to help those with ADHD to help manage their symptoms along with their medication (Ratey, 2008). The best strategy is physical activity/exercise in the morning. Ratey (2008) suggests regular aerobic workouts at 65% to 75% of maximum heart rate for twenty to thirty minutes each school day or a minimum of thirty minutes of daily aerobic activity. It is believed that each workout provides sixty to ninety minutes of subsequent calm, focus and clarity for those with ADHD.

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Hanover Wellness Education News

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What is body Composition?

Body composition refers to dividing the body into components such as fat mass, fat free mass, lean body mass, bone, total body water, minerals and proteins. It is commonly expressed as percent body fat (Vehrs and Hager, 2006). Body mass composition assessment is often done through skinfold measurements and bio-electrical impedance (Vehrs and Hager, 2006). Some use body mass index (BMI) as a body composition alternative (PCPFS, 2008).

Excess body fat lowers aerobic fitness and reduces the ability to perform many activities that require jumping and moving quickly. Appropriate body composition is important for general health and appearance and for maximizing athletic performance. Percent body fat is simply the proportion of total weight that is fat weight.

The majority of body fat is stored in fat cells (adipocytes) beneath the skin (subcutaneous fat) and around organs (visceral fat). A smaller amount of fat is stored in most other cells around the body. Some fat (8-12% in females and 3-5% in males) is necessary for normal body function such as the fat within the nervous system or around visceral organs in females (Kaminsky and Dyer, 2006). Subcutaneous and visceral fat play important roles, but too much raises the risk of cardiovascular disease, type 2 diabetes, hypertension, hyperlipidemia, metabolic syndrome, coronary artery disease, and some types of cancer (Vehrs and Hager, 2006).

Body composition measurements divide the body into two categories: fat free mass and fat mass. Every person should possess at least a small amount of essential fat for good health. Essential fat is necessary for temperature regulation, shock absorption and regulation of essential body nutrients. Nonessential fat is fat, above the essential fat levels that accumulate when we take in more calories than we expend. When there are excessive amounts of nonessential fat, overfatness and even obesity can happen.

Body composition is unlike the other health related fitness components (i.e., cardio-respiratory endurance, muscle fitness and flexibility) since it is not a performance measure and requires no movement. For this reason, some experts consider body composition to be an aspect of metabolic fitness (Corbin et al, 2004). Metabolic fitness is a positive state of the physiological systems associated with reduced risk of diseases like diabetes and heart disease. Metabolic fitness is demonstrated by healthy: blood fat profiles, blood pressure, blood sugar and insulin levels (Corbin et al 2004).

Next month’s issue will explore how to measure one’s body composition.

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Hanover Wellness Education News

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How can body composition be measured?

This month's wellness news explores three popular methods for identifying one's body composition. These methods include skinfold measurement, bioelectrical impedance analysis, and body mass index.

Measuring body composition (estimating percent body fat)
Test item: Skinfold measurement
Purpose: to measure the triceps and calf skinfold thicknesses (on the right sides of the body) for calculating percent body fat.

Protocol: Skinfold measurement involves measuring a double thickness of skin and subcutaneous fat with a caliper. The triceps site is located midway between the shoulder (acromion process) and the elbow. The pinch should be made slightly above the midway point so that the skinfold calipers can be placed directly on the proper location. The skinfold site should be vertical. For the calf skinfold, students place their right foot on a stool so that the knee is at a 90 degree angle The calf skinfold site is located medially at the largest calf girth (on the right calf). The vertical skinfold should be grasped firmly with the thumb and forefinger. The skinfold should be lifted away from the body tissue. The calf pinch is made slightly above the largest girth so the skinfold calipers will be placed on the correct site.

Three measurements should be taken at each site. The median (middle) score should be the criterion score. If a reading differs from other readings by 2 mm or more, another measurement should be taken (and the differing reading should be deleted). The caliper should be in the middle of the fold. The grasp should not cause pain to the examinee. The recommended procedure is to do one measurement at each site (one set). The process should be done in three consecutive sets.

Skinfold measurements must be converted to percent body fat. The sum of triceps and calf skinfolds are converted to percent body fat using the equations from Slaughter et al (1988). Skinfold measurements are largely unaffected by physical activity, level of hydration and other factors that are hard to control.

Notes on skinfold measurements
Research has shown that skinfold measurements can provide a good estimate of percent body fat for children and adolescents (Baumgartner et al, 2003; Vehrs and Hager, 2006). In comparison to adults, children have a higher water and lower bone mineral content, and these levels change as they grow (Baumgartner et al, 2003). When performing skinfold measurements the triceps and calf skinfolds should be used (Slaughter et al, 1988). These sites are easier to measure and do not require the removal of clothing. Improper site location is a common reason for skinfold measurement error. All measurements should be taken on the right side of the body

(Baumgartner et al, 2003). Skinfold measurements should always be done in a private environment in order to protect confidentiality and reduce potential embarrassment.

It is recommended that the same tester take pre and post test measurements. Once you have taken skinfold measurements on 75-100 participants and your results compare closely with an expert tester you can consider yourself competent. A plus or minus 3-3.5% measurement error exists when estimating percent body fat with calipers (Vehrs and Hager, 2006).

Biolectrical impedance analysis

Bioelectrical impedance analysis (BIA) can provide an alternative to skinfold testing. BIA is based on the principle that the electrical resistance of the body to a low level electrical current is related to total body water. Total body water and fat free weight are highly related. Factors affecting the water content of fat free mass will affect the accuracy of predicted percent body fat. Hydration status can be affected by recent physical activity, fluid consumption, time of last meal, caffeine consumption and menstruation. BIA estimates of percent body fat have an error margin of plus or minus 3.5 to 5% (Vehrs and Hager, 2006). A body with more muscle will also have more total body water (and low resistance to current flow). A body with more fat will have less total body water and greater resistance to current flow (Meredith and Welk, 2004). A BIA device may work well for those who do not feel comfortable taking skinfold measurements. Some of these devices work like a bathroom scale (students are measured barefoot).

There will be error in measuring percent body fat since no method measures body fat directly nor does any method make a perfect prediction. The “gold standards” of body composition assessment are air displacement plethysmography (Bod Pod) and dual energy x-ray absorptiometry (DEXA). They are usually found in laboratory settings because of cost and size. Formerly, underwater weighing or hydrodensitometry had been regarded as the most accurate body composition assessment (Vehrs and Hager, 2006). Measurement of skinfold thicknesses and electrical impedance are the two most practical methods of body composition assessment within physical education settings.

Body mass index

BMI is appropriate for mass testing. However, it is does not differentiate between fat and fat free weight. BMI is meant to be an indicator of obesity. BMI is calculated as weight (in kilograms) divided by height (in meters squared). Weight in pounds can be translated to kilograms by dividing by 2.2. Height in inches can be converted to meters by multiplying by 0.0254. A BMI calculator can be found at www.presidentschallenge.org/tools_to_help/bmi.aspx. Students should remove their shoes when being measured for height and weight. FTINESSGRAM protocol encourages dropping fractions of an inch or a pound and using the last whole number. For example, a height of 4 feet 6 and ½ inches would be recorded as 4 feet 6 inches, and a weight of 88.5 pounds would be recorded as 88 pounds. Body mass index is not the recommended test item for determining body composition because it does not identify the percent of fat. It only provides information on weight relative to height. If a

student is identified as too heavy for their height a skinfold test could clarify whether they weight is due to excess fat.

BMI is a poor predictor of percent body fat. Many children and adolescents who have not reached their growth spurt will have high BMI values. BMI should be described as a ratio of weight to height that is used to describe body weight as underweight, normal, at risk for overweight, or overweight for children and adolescents (Vehrs and Hager, 2006).

BMI provides an indication of the appropriateness of a child's weight relative to height. It is a mathematical formula by which a person's body weight in kilograms is divided by the square of their weight in meters. In children and adolesecents body mass index is used to assess underweight, overweight and risk for overweight. Children's body fatness changes over the years with growth. Boys and girls differ in their body fatness as they mature. BMI for children (BMI-for-age) is gender and age specific. BMI-for-age is plotted on gender specific growth charts. These pediatric growth charts are available online (http://www.cdc.gov/growthcharts) and permit longitudinal tracking of BMI. At risk for overweight has been defined as a sex and age specific BMI between the 85th and 95th percentile. BMI at or above the 95th percentile is considered overweight or obese. It is important to note that BMI may misclassify physically active people who have a large amount of muscle mass (CDC, 2004; American Academy of Pediatrics, 2003).

Body composition testers must be sensitive and responsive to each student's need for confidentiality with regard to all assessment results. This is especially true for body composition assessment. Further, students should not have to expose parts of their body normally covered by clothing. Students should respect another's wish to have their score remain private. We should discourage the sharing of scores and the comparing of results. These scores are only a prediction of body compostion. Finally, we must teach learners about body composition and its relationship to their health and fitness.

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Hanover Wellness Education News

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Are the chemicals added to food good for us?

Food used to come from farms. Now, much of our food contains chemical additives. Food additives thicken salad dressings, keep luncheon meats from turning gray, make microwave popcorn taste buttery, and sweeten our foods. It is essential for consumers to know: what these chemicals do, which ones are safe, and which are poorly tested or unhealthy.

As a general rule avoid sodium nitrite, saccharin, olestra, acesulfame potassium, and artificial colorings (CSPI, 2008a). They are among the most questionable additives. They are also used primarily in foods of low nutritional value.

The two most familiar additives are sugar and salt. They might present the greatest risk because we consume them in abundance. Fortunately, most additives are safe and some even increase the nutritional value of the food.

The following additives are considered unsafe or are very poorly tested.

ACESULFAME POTASSIUM – artificial sweetener found in chewing gum, soda and other beverages, no added sugar baked goods, desserts, table top sweetener (Sunett)
ARTIFICIAL COLORINGS: BLUE 1, BLUE 2,GREEN 3, RED 3, YELLOW 6 – Artificial colors are usually found in foods of minimal nutritional value (i.e., junk food). The presence of these colors often demonstrates the absence of whole foods such as fruit and vegetables.
ASPARTAME (Nutrasweet) – artificial sweetener.
BUTYLATED HYDROXYANISOLE (BHA) – antioxidant – cereal packages, chewing gym, oil, potato chips
PARTIALLY HYDROGENATED VEGETABLE OIL – fat found in baked goods, fried foods, icing, microwave popcorn, pie crust, cookies, energy and granola bars – these trans fats raise LDL (bad cholesterol) and lower HDL (good cholesterol).
OLESTRA (Olean) – synthetic fat found in certain potato chips
POTASSIUM BROMATE – dough strengthener: white flour.
PROPYL GALLATE – antioxidant preservative found in chewing gum, chicken soup base, meat, potato sticks, oil
SACCHARIN – artificial sweetener found in no sugar added foods, table top sweetener (sweet'N Low)
SODIUM NITRATE/SODIUM NITRITE - coloring, flavoring, preservative found in bacon, corned beef, frankfurters, ham, luncheon meat, smoked fish.
STEVIA – sweetener – dietary supplement.
Source – The Center for Science in the Public Interest (CSPI, 2008b). For more information on these and other additives visit CSPI's website (2008a).

Definitions of some food additive terms (CSPI, 2008a)

ANTIOXIDANTS retard the oxidation of unsaturated fats and oils, colorings, and flavorings. Oxidation leads to rancidity, flavor changes, and loss of color. Most of those effects are caused by reaction of oxygen in the air with fats.

CARCINOGEN an agent that causes cancer in animals or humans.

CHELATING AGENTS trap trace amounts of metal atoms that would otherwise cause food to discolor or go rancid.

EMULSIFIERS keep oil and water together.

FLAVOR ENHANCERS have little or no flavor of their own, but accentuate the natural flavor of foods.

THICKENING AGENTS are natural or chemically modified carbohydrates that absorb some of the water that is present in food, thereby making the food thicker. Thickening agents "stabilize" factory-made foods.

Cancer Testing
Chemicals are often tested to identify their ability to cause cancer by feeding large dosages to small numbers of rats and mice. The large dosages can compensate for the possibility that rodents may be less sensitive than people to a particular chemical. Some claim that such tests are improper and that large amounts of any chemical would cause cancer – Not true (CSPI, 2008a).

Huge amounts of most chemicals do not cause cancer. When a large dosage causes cancer, most scientists believe that a smaller amount would also cause cancer, but less frequently.

Some progress has been made in the prevention of animal testing. Animal testing is done in order to cheaply and accurately identify cancer-causing chemicals. While some progress has been made in that direction, those tests have not proven reliable. The standard high-dosage cancer test on small numbers of animals is currently the only practical, reasonably reliable way to identify food additives that might cause cancer.

The Delaney Clause is an important part of the federal Food, Drug, and Cosmetic Act. That important consumer-protection clause specifically bans any additive that "is found to induce cancer when ingested by man or animal." The food and chemical industries are seeking to weaken or repeal that law.

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Hanover Wellness Education News

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The Importance of Failure in Education

"…experience success and failure not as reward and punishment, but as information."
Jerome Bruner (1961, p. 31)

Teachers and parents hope students will learn and achieve at high levels. This means we must celebrate challenge and see mistakes and failure as a normal and necessary part of learning. Students need to know that it is OK to be a beginner and to make mistakes. Mistakes simply show us how much more we need to learn. It is also important for students to apply what they are learning within an appropriate context. For example, we would not expect a beginning dancer to perform within a ballroom dance competition in front of a large audience.

Not all students achieve competency at the same time. It might take some longer than others to get there. However, many beginners believe they lack ability when their performances are compared to higher achieving peers (Robinson, 2001). We must believe in the abilities of all learners and show them evidence of their progress.

In June, 2008 author J. K. Rowling addressed the graduating class at Harvard University. She spoke of the challenges and obstacles she faced prior to her success as an author and the importance of failure with the following remarks,

"You might never fail on the scale I did, but some failure in life is inevitable. It is impossible to live without failing at something, unless you live so cautiously that you might as well not have lived at all - in which case, you fail by default.

Failure gave me an inner security that I had never attained by passing examinations. Failure taught me things about myself that I could have learned no other way. I discovered that I had a strong will, and more discipline than I had suspected; I also found out that I had friends whose value was truly above rubies.

The knowledge that you have emerged wiser and stronger from setbacks means that you are, ever after, secure in your ability to survive. You will never truly know yourself, or the strength of your relationships, until both have been tested by adversity. Such knowledge is a true gift, for all that it is painfully won, and it has been worth more to me than any qualification I ever earned (Rowling, 2008)."

Providing feedback that encourages learning.

"I am here as a witness to describe, not as a judge to evaluate." Elie Wiesel (Deci & Flaste, 1996, p.118)

Feedback given to children should identify performance strengths and weaknesses. When students recognize their current performance level in relation to the desired performance level they can use corrective feedback to close the gap. In other words, mistakes only lead to success if we explore what went wrong and attempt to revise and improve performance.

Driven by curiosity, intrinsic motivation, and a need for competence.

Sometimes there is too much emphasis on how well students are doing and not enough on what they are doing. This can change how students see themselves (Dweck, 2000). Education (e.g., high stakes test scores and feedback) can stamp a label on a student. It convinces some that they are good, able, and desirable. Unfortunately, others are left feeling they are deficient, bad and undesirable (Robinson, 2001; Stiggins et al, 2004). It is unlikely that this continual labeling benefits the self-concept and development of some students (Bloom et al, 1971). Scores, grades and feedback can also cause students to continually compare their performance to that of their peers. Instead, we should compare student performance to the student's previous performance and learning targets.

Students can learn to focus on sustained effort and improvement by learning to set their own goals, monitor their performance and evaluate their progress. Students should compare their performance to established criteria and their previous performances. We should avoid comparing a child's performance to those of their peers. Deci and Flaste (1996, p. 196) note, "Meaningful change occurs when people accept themselves, take interest in why they do what they do, and then decide that they are ready to do differently."

The field of psychology has much to say about motivation, success and failure. One interesting belief is called drive theory. This theory (Atkinson, 1987) states that much of human motivation can be explained by two competing drives. These include striving for success and a fear of failure. People move toward one drive or the other. They either become success oriented or failure avoidant.

Those who are success oriented anticipate good feelings that come with performing a task successfully. Failure avoidant students anticipate failure and the negative feelings that accompany tasks and challenges (Atkinson & Raynor, 1974; Marzano, 2006). The way that students explain or attribute their performance on a task (e.g., test) can encourage them or discourage future effort (Weiner, 1974). Students who are success oriented believe that working hard will bring success. Failure avoidant learners who do not perform well will be discouraged. The success oriented student who fails will work harder on the next task.

Failure avoidant students become discouraged when faced with challenging tasks. They anticipate negative feelings that come with failure. Failure avoidant students might do things that ensure failure such as procrastinating, setting unachievable goals, and identifying minor weaknesses. In other words, they will make up excuses to explain why they believe they are going to fail (Marzano, 2006). Success does little to boost their desire for challenge or their ability to cope with setbacks. In fact, it has the opposite effect. These students prefer tests they can already do well on in order to appear competent. These students believe they are not in control of their success.

The way that students explain or attribute failure and success can discourage or encourage them (Weiner, 1974). Students attribute achievement to four basic causes: ability, luck, effort, and task difficulty. Those who attribute success to their own ability and effort are said to have an internal (locus of) control over their success. These students see themselves as being able. When they confront a challenge they will likely feel in control, anticipate success, and put forth effort to attain a goal. Motivation is increased when students believe they are successful because of the effort they put forth. Conversely, some students attribute success to others. They believe that success in school most likely resulted from luck or from the teacher. These students believe they are not in control of success. They have an external locus of control.

Recommendation

Adults must help students interpret failure positively. They must help children and adolescents care about what they are learning and show them evidence that effort results in quality performance. Success (and fun) means learning and improving.

"Focus on remedies, not faults." Jack Nicklaus (Freeman, 1995, p. 43)

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Hanover Wellness Education News

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What is a Walking School Bus?

The information from this month's issue comes from the U. S. Department of Transportation.

A walking school bus is a group of children walking to school with one or more adults. If that sounds simple, it is, and that's part of the beauty of the walking school bus. It can be as informal as two families taking turns walking their children to school to as structured as a route with meeting points, a timetable and a regularly rotated schedule of trained volunteers.

A variation on the walking school bus is the bicycle train, in which adults supervise children riding their bikes to school. The flexibility of the walking school bus makes it appealing to communities of all sizes with varying needs.

Parents often cite safety issues as one of the primary reasons they are reluctant to allow their children to walk to school. Providing adult supervision may help reduce those worries for families who live within walking or bicycling distance to school.

Starting simple
When beginning a walking school bus, remember that the program can always grow. It often makes sense to start with a small bus and see how it works. Pick a single neighborhood that has a group of parents and children who are interested. It's like a carpool—without the car—with the added benefits of exercise and visits with friends and neighbors. For an informal bus:

- Invite families who live nearby to walk.
- Pick a route and take a test walk.
- Decide how often the group will walk together.
- Have fun!

When picking a route, answer these questions:

- Do you have room to walk?
- Are there sidewalks and paths?
- Is there too much traffic?
- Is it easy to cross the street?
- Do drivers yield to walkers?
- Does the environment feel safe?
- Are there loose dogs?

Success with a simple walking school bus or a desire to be more inclusive may inspire a community to build a more structured program. This may include more routes, more days of walking and more children. Such programs require coordination, volunteers and potential attention to other issues, such as safety training and liability. The school principal and administration, law enforcement and other community leaders will likely be involved.

First, determine the amount of interest in a walking school bus program. Contact potential participants and partners:

- Parents and children
- Principal and school officials
- Law enforcement officers
- Other community leaders

Second, identify the route(s).

- The amount of interest will determine the number of walking routes.
- Walk the route(s) without children first.

Third, identify a sufficient number of adults to supervise walkers. The Centers for Disease Control and Prevention recommends one adult for every six children. If children are age 10 or older, fewer adults may be needed. If children are ages 4 to 6, one adult per three children is recommended.

Last, finalize the logistical details.

- Who will participate?
- How often will the walking school bus operate? Will the bus operate once a week or every day?
- When do children meet the bus? It's important to allow enough time for the slower pace of children, but also to ensure that everyone arrives at school on time.
- Where will the bus meet children—at each child's home or at a few meeting spots?
- Will the bus operate after school?
- What training do volunteers need?
- What safety training do children need?

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Pedestrian and Bicycle Information Center for the Partnership for a Walkable America and the U.S. Department of Transportation. (2008). starting a walking school bus. Retrieved August, 25, 2008 from http://www.walkingschoolbus.org

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Walking and Biking to School

A line of cars and buses crawls up to the main entrance of the Middling School in Anytown, USA. Some parents and caregivers drive less than a mile and wait in line for twenty minutes to drop off their students. Staff and students walking along the sidewalk to the entrance breathe in pollutants emitted from these vehicles each day. This year the Anytown district will spend the greatest percentage of its budget in its history on fuel for transportation to and from schools.

This scene is played out in many schools across the U. S. Active travel (walking or bicycling) can be a health enhancing, budget friendly, "green" and safe way to and from school. Walking to school is a missed opportunity. Roughly 10% of children nationwide walk to school regularly. Even among those kids living within a mile of their school, only 25% are regular walkers.

Physical activity is an important part of a healthy lifestyle; however, many children in the United States do not meet recommended levels of physical activity. Although walking and biking to school can increase physical activity among children, motor-vehicle traffic and other factors can make these activities difficult. The majority of U.S. children do not walk or bike to school, approximately one third ride a school bus, and half are driven in a private vehicle (CDC, 2002).

Safety Concerns

Some of the best ways to increase the safety of a child's walk or bike to school are to:

- Provide safe, well-maintained walkways separate from vehicles
- Teach children to cross streets at marked crossings, and provide ample, well-designed, accessible, and when necessary monitored crosswalks
- Slow traffic in neighborhoods and near schools

Parents and other adults worry about strangers and other dangers on the way to school. While the actual occurrences are extremely rare, consideration should be taken to address parent fears and create a plan to reduce risk. Parent accompaniment of children on the walk to school is one way to solve this concern. Some communities use walking school buses as a way to have an adult presence on the street. When there are more adults and children walking and biking on the road, the community becomes accustomed to their presence.

Benefits of Walking and Biking to School

- Increased levels of daily physical activity for children.
- Increased likelihood that children and adults will choose to walk and bike for other short distance trips.
- Improved neighborhood safety.
- Fewer cars traveling through the neighborhood.
- Fewer cars congesting the pick-up and drop-off points at the school.
- Friendlier neighborhoods as people get out and about interacting with one another.

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