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Physical Activity Guidelines for Adults

The following information is from the United States Department of Health and Human Services (USDHHS, 2008).

Being physically active is one of the most important steps that Americans of all ages can take to improve their health. The *2008 Physical Activity Guidelines for Americans* provides science-based guidance to help Americans aged 6 and older improve their health through appropriate physical activity.

The U.S. Department of Health and Human Services (HHS) issues the *Physical Activity Guidelines for Americans*. The content of the *Physical Activity Guidelines* complements the *Dietary Guidelines for Americans*, a joint effort of HHS and the U.S. Department of Agriculture (USDA). Together, the two documents provide guidance on the importance of being physically active and eating a healthy diet to promote good health and reduce the risk of chronic diseases.

The primary audiences for the *Physical Activity Guidelines* are policymakers and health professionals. These Guidelines are designed to provide information and guidance on the types and amounts of physical activity that provide substantial health benefits. This information may also be useful to interested members of the public. The main idea behind the Guidelines is that regular physical activity over months and years can produce long-term health benefits. Realizing these benefits requires physical activity each week.

Regular physical activity can produce longterm health benefits.

The *Physical Activity Guidelines for Americans* describes the major research findings on the health benefits of physical activity:

- Regular physical activity reduces the risk of many adverse health outcomes.
- Some physical activity is better than none.
- For most health outcomes, additional benefits occur as the amount of physical activity increases through higher intensity, greater frequency, and/or longer duration.
- Most health benefits occur with at least 150 minutes (2 hours and 30 minutes) a week of moderate intensity physical activity, such as brisk walking. Additional benefits occur with more physical activity.
- Both aerobic (endurance) and muscle-strengthening (resistance) physical activity are beneficial.
- Health benefits occur for children and adolescents, young and middle-aged adults, older adults, and those in every studied racial and ethnic group.
- The health benefits of physical activity occur for people with disabilities.
- The benefits of physical activity far outweigh the possibility of adverse outcomes.

The following are the key Guidelines included in the *Physical Activity Guidelines for American Adults*:

Key Guidelines for Adults

- All adults should avoid inactivity. Some physical activity is better than none, and adults who participate in any amount of physical activity gain some health benefits.
- For substantial health benefits, adults should do at least 150 minutes (2 hours and 30 minutes) a week of moderate-intensity, or 75 minutes (1 hour and 15 minutes) a week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous intensity aerobic activity. Aerobic activity should be performed in episodes of at least 10 minutes, and preferably, it should be spread throughout the week.
- For additional and more extensive health benefits, adults should increase their aerobic physical activity to 300 minutes (5 hours) a week of moderate intensity, or 150 minutes a week of vigorous intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity activity. Additional health benefits are gained by engaging in physical activity beyond this amount.
- Adults should also do muscle-strengthening activities that are moderate or high intensity and involve all major muscle groups on 2 or more days a week, as these activities provide additional health benefits.

Key Guidelines for Older Adults

The Key Guidelines for Adults also apply to older adults. In addition, the following Guidelines are just for older adults:

- When older adults cannot do 150 minutes of moderate-intensity aerobic activity a week because of chronic conditions, they should be as physically active as their abilities and conditions allow.
- Older adults should do exercises that maintain or improve balance if they are at risk of falling.
- Older adults should determine their level of effort for physical activity relative to their level of fitness.
- Older adults with chronic conditions should understand whether and how their conditions affect their ability to do regular physical activity safely.

Key Guidelines for Safe Physical Activity

To do physical activity safely and reduce the risk of injuries and other adverse events, people should:

- Understand the risks and yet be confi dent that physical activity is safe for almost everyone.
- Choose to do types of physical activity that are appropriate for their current fitness level and health goals, because some activities are safer than others.

- Increase physical activity gradually over time whenever more activity is necessary to meet guidelines or health goals. Inactive people should “start low and go slow” by gradually increasing how often and how long activities are done.
- Protect themselves by using appropriate gear and sports equipment, looking for safe environments, following rules and policies, and making sensible choices about when, where, and how to be active.
- Be under the care of a health-care provider if they have chronic conditions or symptoms. People with chronic conditions and symptoms should consult their health-care provider about the types and amounts of activity appropriate for them.

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Physical Activity Guidelines for Children and Adolescents Ages 6-17.

The following information is from the United States Department of Health and Human Services (USDHHS, 2008).

As children become adolescents, they typically reduce their physical activity. Adults play an important role in providing age-appropriate opportunities for physical activity. In doing so, they help lay an important foundation for life-long, health-promoting physical activity. Adults need to encourage active play in children and encourage sustained and structured activity as children grow older.

Key Guidelines for Children and Adolescents

Children and adolescents should do 60 minutes (1 hour) or more of physical activity daily.

Aerobic: Most of the 60 or more minutes a day should be either moderate- or vigorous-intensity aerobic physical activity, and should include vigorous-intensity physical activity at least 3 days a week.

Muscle-strengthening: As part of their 60 or more minutes of daily physical activity, children and adolescents should include muscle-strengthening physical activity on at least 3 days of the week.

Bone-strengthening: As part of their 60 or more minutes of daily physical activity, children and adolescents should include bone-strengthening physical activity on at least 3 days of the week.

It is important to encourage young people to participate in physical activities that are appropriate for their age, that are enjoyable, and that offer variety.

Types of Activity

The Guidelines for children and adolescents focus on three types of activity: aerobic, muscle-strengthening, and bone-strengthening. Each type has important health benefits.

Aerobic activities are those in which young people rhythmically move their large muscles. Running, hopping, skipping, jumping rope, swimming, dancing, and bicycling are all examples of aerobic activities. Aerobic activities increase cardiorespiratory fitness. Children often do activities in short bursts, which may not technically be aerobic activities. However, this document will also use the term aerobic to refer to these brief activities.

Muscle-strengthening activities make muscles do more work than usual during activities of daily life. This is called “overload,” and it strengthens the muscles. Muscle-strengthening activities can be unstructured and part of play, such as playing on playground equipment, climbing trees, and playing tug-of-war. Or these activities can be structured, such as lifting weights or working with resistance bands.

Bone-strengthening activities produce a force on the bones that promotes bone growth and strength. This force is commonly produced by impact with the ground. Running, jumping rope, basketball, tennis, and hopscotch are all examples of bone strengthening activities. As these examples illustrate, bone-strengthening activities can also be aerobic and muscle-strengthening.

This kind of activity, which includes **resistance training** and lifting weights, causes the body's muscles to work or hold against an applied force or weight. These activities often involve relatively heavy objects, such as weights, which are lifted multiple times to train various muscle groups. Muscle-strengthening activity can also be done by using elastic bands or body weight for resistance (climbing a tree or doing push-ups, for example).

Muscle-strengthening activity also has three components:

Intensity, or how much weight or force is used relative to how much a person is able to lift;

Frequency, or how often a person does muscle strengthening activity; and

Repetitions, or how many times a person lifts a weight (analogous to duration for aerobic activity). The effects of muscle-strengthening activity are limited to the muscles doing the work. It's important to work all the major muscle groups of the body: the legs, hips, back, abdomen, chest, shoulders, and arms.

How Age Influences Physical Activity in Children and Adolescents

Children and adolescents should meet the Guidelines by doing activity that is appropriate for their age. Their natural patterns of movement differ from those of adults. For example, children are naturally active in an intermittent way, particularly when they do unstructured active play. During recess and in their free play and games, children use basic aerobic and bone-strengthening activities, such as running, hopping, skipping, and jumping, to develop movement patterns and skills. They alternate brief periods of moderate- and vigorous-intensity physical activity with brief periods of rest. Any episode of moderate- or vigorous–intensity physical activity, however brief, counts toward the Guidelines.

Children also commonly increase muscle strength through unstructured activities that involve lifting or moving their body weight or working against resistance. Children don't usually do or need formal muscle-strengthening programs, such as lifting weights.

Regular physical activity in children and adolescents promotes a healthy body weight and body composition.

As children grow into adolescents, their patterns of physical activity change. They are able to play organized games and sports and are able to sustain longer periods of activity. But they still commonly do intermittent activity, and no period of moderate- or vigorous-intensity activity is too short to count toward the Guidelines.

Adolescents may meet the Guidelines by doing free play, structured programs, or both. Structured exercise programs can include aerobic activities, such as playing a sport, and muscle-strengthening activities, such as lifting weights, working with resistance bands, or using body weight for resistance (such as push-ups, pull-ups, and sit-ups). Muscle-strengthening activities count if they involve a moderate to high level of effort and work the major muscle groups of the body: legs, hips, back, abdomen, chest, shoulders, and arms.

Levels of Intensity for Aerobic Activity

Children and adolescents can meet the Guidelines by doing a combination of moderate- and vigorous intensity aerobic physical activities or by doing only vigorous-intensity aerobic physical activities.

Youth should not do only moderate-intensity activity. It's important to include vigorous-intensity activities because they cause more improvement in cardiorespiratory fitness.

The intensity of aerobic physical activity can be defined on either an absolute or a relative scale. Either scale can be used to monitor the intensity of aerobic physical activity:

> **Absolute intensity** is based on the rate of energy expenditure during the activity, without taking into account a person's cardiorespiratory fitness.
>
> **Relative intensity** uses a person's level of cardiorespiratory fitness to assess level of effort.

Relative intensity describes a person's level of effort relative to his or her fitness. As a rule of thumb, on a scale of 0 to 10, where sitting is 0 and the highest level of effort possible is 10, moderate-intensity activity is a 5 or 6. Young people doing moderate-intensity activity will notice that their hearts are beating faster than normal and they are breathing harder than normal. Vigorous-intensity activity is at a level of 7 or 8. Youth doing vigorous-intensity activity will feel their heart beating much faster than normal and they will breathe much harder than normal.

When adults supervise children, they generally can't ascertain a child's heart or breathing rate. But they can observe whether a child is doing an activity which, based on absolute energy expenditure, is considered to be either moderate or vigorous. For example, a child walking briskly to school is doing moderate-intensity activity. A child running on the playground is doing vigorous-intensity activity. The table on page 18 includes examples of activities classified by absolute intensity. It shows that the same activity can be moderate or vigorous intensity, depending on factors such as speed (for example bicycling slowly or fast).

Examples of Moderate- and Vigorous-Intensity Aerobic Physical Activities and Muscle- and Bone-Strengthening Activities for Children and Adolescents

Type of Physical Activity	Age Group□Children	Age Group□Adults
Moderate–intensity aerobic	Active recreation, such as hiking, skateboarding, rollerblading Bicycle riding	Active recreation, such as canoeing, hiking, skateboarding, rollerblading Brisk walking

	Brisk walking	Bicycle riding (stationary or road bike) Housework and yard work, such as sweeping or pushing a lawn mower Games that require catching and throwing, such as baseball and softball
Vigorous–intensity aerobic	Active games involving running and chasing, such as tag Bicycle riding Jumping rope Martial arts, such as karate Running Sports such as soccer, ice or field hockey, basketball, swimming, tennis Cross-country skiing	Active games involving running and chasing, such as flag football Bicycle riding Jumping rope Martial arts, such as karate Running Sports such as soccer, ice or field hockey, basketball, swimming, tennis Vigorous dancing Cross-country skiing
Muscle-strengthening	Modified push-ups (with knees on the floor) Resistance exercises using body weight or resistance bands Rope or tree climbing Sit-ups (curl-ups or crunches) Swinging on playground equipment/bars	Push-ups and pull-ups Resistance exercises with exercise bands, weight machines, hand-held weights Climbing wall Sit-ups (curl-ups or crunches)
Bone-	Games such as hopscotch Hopping, skipping,	Hopping, skipping, jumping

strengthening	jumping Jumping rope Running Sports such as gymnastics, basketball, volleyball, tennis	Jumping rope Running Sports such as gymnastics, basketball, volleyball, tennis

Note: Some activities, such as bicycling, can be moderate or vigorous intensity, depending upon level of effort

Physical Activity and Healthy Weight

Regular physical activity in children and adolescents promotes a healthy body weight and body composition.

Exercise training in overweight or obese youth can improve body composition by reducing overall levels of fatness as well as abdominal fatness. Research studies report that fatness can be reduced by regular physical activity of moderate to vigorous intensity 3 to 5 times a week, for 30 to 60 minutes.

Meeting the Guidelines

American youth vary in their physical activity participation. Some don't participate at all, others participate in enough activity to meet the Guidelines, and some exceed the Guidelines.

Children and adolescents can meet the Physical Activity Guidelines and become regularly physically active in many ways.

One practical strategy to promote activity in youth is to replace inactivity with activity whenever possible. For example, where appropriate and safe, young people should walk or bicycle to school instead of riding in a car. Rather than just watching sporting events on television, young people should participate in age-appropriate sports or games.

> **Children and adolescents who do not meet the Guidelines** should slowly increase their activity in small steps and in ways that they enjoy. A gradual increase in the number of days and the time spent being active will help reduce the risk of injury.

Children and adolescents who meet the Guidelines should continue being active on a daily basis and, if appropriate, become even more active. Evidence suggests that even more than 60 minutes of activity every day may provide additional health benefits.

Children and adolescents who exceed the Guidelines should maintain their activity level and vary the kinds of activities they do to reduce the risk of overtraining or injury.

Children and adolescents with disabilities are more likely to be inactive than those without disabilities. Youth with disabilities should work with their health-care provider to understand the types and amounts of physical activity appropriate for them. When possible, children and adolescents with disabilities should meet the Guidelines. When young people are not able to participate in appropriate physical activities to meet the Guidelines, they should be as active as possible and avoid being inactive.

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USDHHS. (2008, October 16). Physical activity guidelines for Americans: Chapter 3: Active children and adolescents. Retrieved July 23, 2009 from

http://www.health.gov/PAguidelines/guidelines/chapter3.aspx

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The Many Benefits of Physical Activity

The following information is from the United States Department of Health and Human Services (USDHHS, 2008).

All Americans should be regularly physically active to improve overall health and fitness and to prevent many adverse health outcomes. The benefits of physical activity occur in generally healthy people, in people at risk of developing chronic diseases, and in people with current chronic conditions or disabilities. This chapter gives an overview of research findings on physical activity and health. The box below provides a summary of these benefits.

Physical activity affects many health conditions, and the specific amounts and types of activity that benefit each condition vary. In developing public health guidelines, the challenge is to integrate scientific information across all health benefits and identify a critical range of physical activity that appears to have an effect across the health benefits. One consistent finding from research studies is that once the health benefits from physical activity begin to accrue, additional amounts of activity provide additional benefits.

Although some health benefits seem to begin with as little as 60 minutes (1 hour) a week, research shows that a total amount of 150 minutes (2 hours and 30 minutes) a week of moderate-intensity aerobic activity, such as brisk walking, consistently reduces the risk of many chronic diseases and other adverse health outcomes.

Examining the Relationship Between Physical Activity and Health

In many studies covering a wide range of issues, researchers have focused on **exercise**, as well as on the more broadly defined concept of physical activity. Exercise is a form of physical activity that is planned, structured, repetitive, and performed with the goal of improving health or fitness. So, although all exercise is physical activity, not all physical activity is exercise.

Studies have examined the role of physical activity in many groups—men and women, children, teens, adults, older adults, people with disabilities, and women during pregnancy and the postpartum period. These studies have focused on the role that physical activity plays in many health outcomes, including:

- Premature (early) death;
- Diseases such as coronary heart disease, stroke, some cancers, type 2 diabetes, osteoporosis, and depression;
- Risk factors for disease, such as high blood pressure and high blood cholesterol;
- **Physical fitness**, such as **aerobic capacity**, and muscle **strength** and endurance
- Functional capacity (the ability to engage in activities needed for daily living);
- Mental health, such as depression and cognitive function; and

- Injuries or sudden heart attacks.

These studies have also prompted questions as to what type and how much physical activity is needed for various health benefi ts. To answer this question, investigators have studied three main kinds of physical activity: aerobic, muscle-strengthening, and bonestrengthening. Investigators have also studied balance and fl exibility activities. These latter two activities are addressed in Chapters 4, 5, and 6.

The Health Benefits of Physical Activity—Major Research Findings

- Regular physical activity reduces the risk of many adverse health outcomes.
- Some physical activity is better than none.
- For most health outcomes, additional benefits occur as the amount of physical activity increases through higher intensity, greater frequency, and/or longer duration.
- Most health benefits occur with at least 150 minutes a week of moderate-intensity physical activity, such as brisk walking. Additional benefits occur with more physical activity.
- Both aerobic (endurance) and muscle-strengthening (resistance) physical activity are beneficial.
- Health benefits occur for children and adolescents, young and middle-aged adults, older adults, and those in every studied racial and ethnic group.
- The health benefits of physical activity occur for people with disabilities.
- The benefits of physical activity far outweigh the possibility of adverse outcomes.

Aerobic Activity

In this kind of physical activity (also called an **endurance activity** or cardio activity), the body's large muscles move in a rhythmic manner for a sustained period of time. Brisk walking, running, bicycling, jumping rope, and swimming are all examples.

Aerobic activity causes a person's heart to beat faster than usual.

Aerobic physical activity has three components:

- **Intensity**, or how hard a person works to do the activity. The intensities most often examined are moderate intensity (equivalent in effort to brisk walking) and vigorous intensity (equivalent in effort to running or jogging);
- **Frequency**, or how often a person does aerobic activity; and
- **Duration**, or how long a person does an activity in any one session.

Although these components make up a physical activity profile, research has shown that the total amount of physical activity (minutes of moderate–intensity physical activity, for example) is more important for achieving health benefits than is any one component (frequency, intensity, or duration).

Muscle-Strengthening Activity

This kind of activity, which includes **resistance training** and lifting weights, causes the body's muscles to work or hold against an applied force or weight. These activities often involve relatively heavy objects, such as weights, which are lifted multiple times to train various muscle groups. Muscle-strengthening activity can also be done by using elastic bands or body weight for resistance (climbing a tree or doing push-ups, for example).

Muscle-strengthening activity also has three components:

- **Intensity**, or how much weight or force is used relative to how much a person is able to lift;
- **Frequency**, or how often a person does muscle strengthening activity; and
- **Repetitions**, or how many times a person lifts a weight (analogous to duration for aerobic activity). The effects of muscle-strengthening activity are limited to the muscles doing the work. It's important to work all the major muscle groups of the body: the legs, hips, back, abdomen, chest, shoulders, and arms.

Bone-Strengthening Activity

This kind of activity (sometimes called weight-bearing or weight-loading activity) produces a force on the bones that promotes bone growth and strength. This force is commonly produced by impact with the ground. Examples of bone-strengthening activity include jumping jacks, running, brisk walking, and weight-lifting exercises. As these examples illustrate, bone-strengthening activities can also be aerobic and muscle strengthening.

The Health Benefits of Physical Activity

Studies clearly demonstrate that participating in regular physical activity provides many health benefits. These benefits are summarized in the accompanying table. Many conditions affected by physical activity occur with increasing age, such as heart disease and cancer. Reducing risk of these conditions may require years of participation in regular physical activity. However, other benefits, such as increased **cardiorespiratory fitness**, increased muscular strength, and decreased depressive symptoms and blood pressure, require only a few weeks or months of participation in physical activity.

Health Benefits Associated With Regular Physical Activity

Children and Adolescents

Strong evidence

- Improved cardiorespiratory and muscular fitness
- Improved bone health
- Improved cardiovascular and metabolic health biomarkers
- Favorable body composition

Moderate evidence

- Reduced symptoms of depression

Adults and Older Adults

Strong evidence

- Lower risk of early death
- Lower risk of coronary heart disease
- Lower risk of stroke
- Lower risk of high blood pressure
- Lower risk of adverse blood lipid profile
- Lower risk of type 2 diabetes
- Lower risk of metabolic syndrome
- Lower risk of colon cancer
- Lower risk of breast cancer
- Prevention of weight gain
- Weight loss, particularly when combined with reduced calorie intake
- Improved cardiorespiratory and muscular fitness
- Prevention of falls
- Reduced depression
- Better cognitive function (for older adults)

Moderate to strong evidence

- Better functional health (for older adults)
- Reduced abdominal obesity

Moderate evidence

- Lower risk of hip fracture
- Lower risk of lung cancer
- Lower risk of endometrial cancer
- Weight maintenance after weight loss
- Increased bone density
- Improved sleep quality

The Beneficial Effects of Increasing Physical Activity: It's About Overload, Progression, and Specificity

Overload is the physical stress placed on the body when physical activity is greater in amount or intensity than usual. The body's structures and functions respond and adapt to these stresses. For example, aerobic physical activity places a stress on the cardiorespiratory system and muscles, requiring the lungs to move more air and the heart to pump more blood and deliver it to the working muscles. This increase in demand increases the efficiency and capacity of the lungs,

heart, circulatory system, and exercising muscles. In the same way, muscle–strengthening and bone-strengthening activities overload muscles and bones, making them stronger.

Progression is closely tied to overload. Once a person reaches a certain fitness level, he or she progresses to higher levels of physical activity by continued overload and adaptation. Small, progressive changes in overload help the body adapt to the additional stresses while minimizing the risk of injury.

Specificity means that the benefits of physical activity are specific to the body systems that are doing the work. For example, aerobic physical activity largely benefits the body's cardiovascular system.

The health benefits of physical activity are seen in children and adolescents, young and middle-aged adults, older adults, women and men, people of different races and ethnicities, and people with disabilities and chronic conditions. The health benefits of physical activity are generally independent of body weight. Adults of all sizes and shapes gain health and fitness benefits by being habitually physically active. The benefits of physical activity also outweigh the risk of injury and sudden heart attacks, two concerns that prevent many people from becoming physically active.

References

United States Department of Health and Human Services (2008). Physical Activity guidelines for Americans: Chapter 2: Physical activity has many benefits. Retrieved August 25, 2009 from http://www.health.gov/paguidelines/guidelines/chapter2.aspx

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What are the Effects of Refined Carbohydrates on the Body?

Americans consume an average of 152 pounds of sugar annually (Brownell & Horgen, 2004).

There is only a 2% chance that a school aged child will consume the recommended number of daily servings from the USDA food pyramid on any given day (USDA, 1996).

This month's newsletter will examine the relationship between the body and consumption of refined carbohydrates. The over-consumption of refined carbohydrate foods and those with added sugars (doughnuts, pastries, cookies, cakes, pie, soda, candies and so forth) has been linked to risks for overweight, obesity, diabetes and heart disease. These foods are ubiquitous. A compelling case can be made for reducing their consumption (whole grain foods are preferred). Foods with added sugars are foods that contain added, naturally derived caloric sweeteners such as sucrose (table sugar), high fructose corn syrup or fruit juice concentrates, all produce similar metabolic effects (Brownell, Farley, Willett, Popkin, Chaloupka, Thompson, & Ludwig, 2009).

The well documented negative physiologic and metabolic effects of consuming a high level of refined carbohydrates such as sugar includes the elevation of triglyceride levels and of blood pressure and the lowering of high density lipoprotein (HDL) cholesterol (the good cholesterol) levels, which would be expected to raise the risk of developing coronary heart disease (Brownell et al, 2009).

Soda (liquid candy) is a significant contributor to childhood obesity and diabetes (Ludwig, Peterson & Gortmaker, 2001). A 20-ounce soda contains about 17 teaspoons of sugar and 250 calories. A 12-ounce soda contains more than 9 teaspoons of sugar. Soft drinks are the largest single source of refined sugar in the United States (Brownell & Horgen, 2004). One study found that for each additional daily soft drink serving to middle school children there was a 60% increased risk of the development of obesity (Brownell & Horgen, 2004).

Soda consumption has also been linked to decreased bone mass density (Willett & Skerrett, 2005). It provides the body nothing but empty calories. When children drink more soda they are consuming less foods rich in vitamin D and calcium (e.g., green leafy vegetables, milk). In other words, if 25% of a child's daily food consumption came from sugary food (i.e., foods of minimal nutritional value) that person needs to get 100% of their daily nutrient requirements from the remaining 75% of their food.

People who eat diets high in sugar get less calcium, fiber, folate, vitamin A, vitamin C, vitamin E, zinc, magnesium, iron, and other nutrients. They also consume fewer fruits and vegetables (CSPI, 1999). Children may also consume sugary beverages in the absence of hunger to satisfy thirst (rather than water) or for social reasons. Sugary drinks may have negative effects on taste preferences and food acceptance. People who habitually consume sugary drinks may find more

satiating but less sweet foods (e.g., vegetables, legumes and fruits) unappealing or unpalatable resulting in a low quality diet (Brownell et al, 2009).

Refined Carbohydrates and Diabetes

Refined carbohydrate intake influences control over blood sugar and in turn, the development of diabetes. A diet high in refined carbohydrates that are quickly digested and absorbed can have damaging consequences. These include higher levels of blood sugar, insulin, and triglycerides, and lower levels of HDL (the "good") cholesterol.

Americans get about half of their calories from carbohydrates. Half of these calories come from refined carbohydrates (e.g., soda, cake, doughnuts, pastries, pizza, chips, bread, bagels, muffins, French fries and so forth). The effects of these foods on our body are significant.

When we consume a food high in sugar the body takes a ride on the blood sugar roller coaster. When we eat a doughnut, cookie, piece of candy, slice of white bread or drink a can of soda the digestible (simple) carbohydrates they contain are broken down into their sugar components. Glucose molecules are rapidly absorbed into the bloodstream and swiftly moved to the far reaches of the circulatory system. A quick elevation of blood sugar is followed quickly by a parallel rise of insulin.

Insulin produced by cells in the pancreas, brings glucose inside of muscle and other cells. As cells quickly absorb glucose, blood sugar levels fall first, followed closely by insulin levels. Once your blood sugar hits its baseline, the liver begins releasing stored glucose to maintain a constant supply.

After a meal packed with these easily digested carbohydrates the resulting flood of insulin can drive glucose levels too low. If there isn't any more digestible carbohydrate in the stomach or intestines, your gut and brain begin sending hunger signals out to you for more food even as the liver starts releasing stored glucose (Willett & Skerrett, 2005).

A meal containing slowly digested whole grain carbohydrates (with "good" fats and protein), levels out the glucose/insulin roller coaster ride. This is because it takes longer for the digestive system to break these carbohydrates into sugar molecules. Blood sugar and insulin levels rise more slowly and peak at lower levels. This process delays the return of hunger.

In many people the body's tissues do not respond to insulin as they should and it resists the "open up" for sugar signal. This resistance to insulin keeps blood sugar at high levels for longer periods and forces the pancreas to produce extra insulin to jam glucose into cells. Insulin making cells may wear out and stop producing insulin (Willett &Skerrett, 2005). Reduced insulin production is an early sign of type 2 diabetes, which is also called non-insulin dependent diabetes (and once called adult-onset diabetes).

Four things contribute to insulin resistance (Willett & Skerrett, 2005): obesity, inactivity, dietary fats and genes. The further you get away from a healthy body mass index (overweight and obesity) the more difficult it will be for your body to handle glucose. The more sedentary you are the lower your ratio of muscle to fat will be, even if you have a healthy weight. Muscle cells

handle glucose and insulin well. Fat cells do not. The less muscle you have the more difficult it will be to clear glucose from the bloodstream. Consuming low levels of polyunsaturated fats and high levels of trans fatty acids can lead to greater insulin resistance.

Finally, insulin resistance is more common among native Americans, pacific islanders and people of Asian heritage and less common among those of European descent. However, those who are genetically predisposed to insulin resistance can beat the condition by staying lean, active while eating an appropriate diet (Willett & Skerrett, 2005).

Chronically high levels of blood sugar and insulin are not good for you. They contribute to many of the contributions of diabetes, such as nerve damage, loss of vision, kidney disease, and wounds that won't heal. Some research suggests that excess blood sugar and insulin may contribute to breast cancer, colon cancer and polycystic ovary syndrome (Willett & Skerrett, 2005). Finally, the negative health effects of sugary drink consumption create excess health care costs. Medical costs attributed to overweight and obesity are estimated at $147 billion or 9.1% of U.S. health care expenditures (Brownell et al, 2009).

Summary

When unhealthy foods are available (even when healthy foods are also available) children will consume them. A body improperly nourished cannot keep the mind alert, inquisitive and sharp (Horgen & Brownell, 2004; Walker, 2005).

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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"It's a simple obvious truth. We need food for the basics of everyday life, to pump blood, move muscles, think thoughts. But we can also eat to live well and live longer. By making the right choices, you will help yourself avoid some of the things we think of as the inevitable penalties of getting older. A healthy diet teamed up with regular exercise and no smoking can eliminate 80% of heart disease and 70% of some cancers. Making poor choices – eating too much of the wrong kinds of food and too little of the right kinds, or too much food altogether – increases your chances of developing cancer, heart disease, diabetes, digestive disorders and aging related loss of vision."

Dr. Walter Willett (2005), Chairman of the Department of Nutrition at the Harvard Medical School of Public Health and professor of medicine at the Harvard Medical School.

Hanover Wellness Education News

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This article will discuss the role hand washing can play in preventing the spread of germs and infection.

How Germs Spread

The main way that illnesses like colds and flu are spread is from person to person in respiratory droplets of coughs and sneezes. This is called "droplet spread."

This can happen when droplets from a cough or sneeze of an infected person move through the air and are deposited on the mouth or nose of people nearby. Sometimes germs also can be spread when a person touches respiratory droplets from another person on a surface like a desk and then touches his or her own eyes, mouth or nose before washing their hands. We know that some viruses and bacteria can live 2 hours or longer on surfaces like cafeteria tables, doorknobs, and desks (CDC, 2004).

Most flu is transmitted through the air in virus laden droplets propelled by coughs and sneezes. Our hands can pick up those droplets from any number of surfaces. hands are an important link in the transmission chain.

Young children are at an increased risk for contracting infectious diseases because they (Minnesota Department of Health, 2008):

Spend time in large groups and are exposed to many new germs
Have immune systems that are not fully developed to fight germs
Do not have complete control of body fluids that contain germs
Have personal habits that spread germs such as thumb sucking, rubbing eyes and putting things in their mouths

Why should I wash my hands?

To prevent the spread of germs (e.g., bacteria, viruses and other microbes) and infection you should regularly and properly wash your hands. You can infect yourself by accumulating germs on your hands and then touching your eyes, nose or mouth. Washing hands can limit the transfer of bacteria, viruses and other microbes.

When should I wash my hands (CDC, 2004, 2008)**?**

After playing outside
After touching people, surfaces and objects
After sneezing or coughing
After using the bathroom
After handling equipment
Before and after preparing food
Before eating
Before and after touching a sick or injured person

Before and after interacting with other people and animals
After handling garbage
Before and after treating a cut or wound

How do I wash my hands (Harvard Medical School, 2007)**?**

Alcohol based hand sanitizers are more effective than antibacterial soaps. Soap and water can be highly effective in ridding the hands of germs. Here are some guidelines for washing hands with soap and water:

Turn on warm water (cold is OK if there is no warm water – cold or warm water are recommended because they increase the likelihood of a longer hand washing session; hot water is more damaging to the skin)
Add soap (regular liquid soap – antibacterial is OK if there is no regular soap)
Rub hands for at least 15-20 seconds, wash one hand with other then switch hands (this reduces bacterial counts by about 90%; When another fifteen seconds of rubbing is added bacterial counts drop to close to 99.9%).
Rub wrists, back of hands, between fingers, fingertips, thumbs, under fingernails
Point fingers down and rinse soap completely from hands and wrists
Dry hands completely with a paper towel (or hand blow dryer)
Use the paper towel that you dried your hands with to turn off water faucet

Additional Hand washing suggestions (Harvard Medical School, 2007)**.**

1. Don't scrub: Scrubbing can damage skin, especially if you wash often. The resulting cracks and small cuts can give pathogens a place to grow.
2. Keep fingernails short: Bacteria like to live under fingernails. Long nails make it more difficult to keep those areas clean.
3. Use hand lotions, especially during winter: Keeping the skin of the your hands intact is necessary for good hand hygiene.
4. Don't wash too fast: It takes about a minute to properly wash and dry your hands.

Soap and water do not kill germs. They work by mechanically (through rubbing of the hands) removing them from your hands. Running water alone can remove some germs. Soap increases the overall effectiveness by pulling undesired material off the skin and into the water.

If your hands are visibly dirty or have food on them, soap and water are more effective than the alcohol based hand sanitizers because the proteins and fats in food tend to reduce alcohol's germ killing power. This is why soap and water are favored in the food service industry. Many liquid soaps also include a moisturizing agent, so your hands may not dry out as quickly from frequent hand washing.

Germs can grow on bar soap and easily spread from one person to another. Bar soap can be used in a household if no one has skin infections (Minnesota Department of Health, 2008). Bar soap should not be used in public restrooms.

How do I wash my hands with an alcohol based hand sanitizer?

Alcohol's power comes from its ability to change the shape of proteins crucial to the survival of bacteria and viruses. Most of the alcohol-based cleansers are 62% alcohol. Alcohol alone would completely dry out people's hands so various skin conditioners are added. Alcohol does an excellent job of getting rid of bacteria and even some viruses. Alcohol does not kill everything – bacterial spores, some protozoa and some "nonenveloped" viruses are not affected. The alcohol-based rub needs to come into contact with all of the surfaces of the hands: back, front, in between fingers and so forth. Small amounts are really no better than washing with plain soap and water (Harvard Medical School, 2007). Here are some guidelines for alcohol-based hand sanitizers (Mayo Clinic, 2009; Harvard Medical School, 2007):

Apply enough of the product to the palm of your hand to wet your hands and wrists completely
Rub your hands together, covering all surfaces, for up to 25 seconds or until they are dry
If your hands are visibly dirty, wash with soap and water.

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Hanover Wellness Education News

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A Formula for Student Success

Learning new and complex movement patterns +
Participation in aerobic physical activity +
Developing Physical Fitness =
Physical Education: A Strong Contributor to Student Learning in all Subject Areas and High Test Scores on Standardized Tests

Movement is essential to memory, emotion, language and learning. The so called higher brain functions evolved from movement and depend on it (Ratey, 2002, p. 148).

Physical activity has a positive influence on concentration, memory, academic performance (including grade point average, scores on standardized tests and grades in specific courses) and classroom behavior (Strong, Malina, Blimkie, Daniels, Dishman, Gutin, Hergenroeder, Must, Nixon, Pivarnik, Rowland, Trost, & Trudeau, 2005).

The increase in childhood overweight and obesity in the U.S. has resulted in more of a focus on the importance of providing students with regular moderate to vigorous physical activity. However, the major focus of public education in America is to meet test score thresholds that increase each year (adequate yearly progress or AYP) mandated by the "No Child Left Behind (NCLB) Act of 2001." Some schools have responded to the rising pressure to lift standardized test scores by shifting resources away from physical activity (i.e., recess and physical education – as well as the arts) in order to provide more time for the two major tested subject areas - mathematics and English/Language arts. These tested curriculum areas have become the overriding or paramount focus in our "what gets tested gets done" age of education.

Reducing or eliminating physical activity programming in favor of tested subject areas such as English/language arts and math instruction is a penny wise and pound foolish approach to the promotion of student learning (Shephard, Volle, Lavalee, LaBarre, Jequier, & Rajic, 1984; Symons, Cinelli, James, & Groff, 1997; Ratey, 2002, 2008; California Department of Education, 2004; Strong, Malina, Blimkie, Daniels, Dishman, Gutin, Hergenroeder, Must, Nixon, Pivarnik, Rowland, Trost, & Trudeau, 2005; Ahamed, MacDonald, Naylor, Liu-Ambrose, & McKay, 2007; Chomitz, Slining, McGowan, Mitchell, Dawson & Hacker, 2009; Hillman, Pontifex, Raine, Castelli, Hall, & Kramer, 2009; Texas Education Agency, 2009).

The body of evidence supporting the relationship of physical activity to cognitive development grows stronger each year. However, American educational decision makers neither recognize it nor act in service of it.

This newsletter will discuss the inextricable relationship of physical activity to cognitive development and academic achievement. This will include: the mind/body connection; the

benefits of learning new and challenging movement patterns; the benefits of participation in aerobic activity; and the relationship of physical fitness to academic achievement.

The Relationship of Physical Activity and Academic Achievement

In this era of overweight, obesity 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. Physical activity causes these branches to grow and bloom with new buds, enhancing brain function. If you had an hour of physical activity this morning you are in the right frame of mind to read and understand this sentence. Your brain is also better equipped to remember it.

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. 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.

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 (Ratey, 2008, p. 53):

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

The Body/Mind Connection

The areas of the brain that control physical movement also coordinate the flow of information (Ratey, 2008, p. 151). The basal ganglia, cerebellum, hippocampus and prefrontal cortex are major players in physical activity and thinking. The view that each brain function is isolated in one area of the brain is false (Ratey, 2002, p. 148).

The cerebellum (with help from the motor cortex and basal ganglia) coordinates physical movement and the movement of thoughts. They order the steps for a physical movement and those necessary for cognitive operations (Ratey, 2002, 362). Just as the cerebellum orders the movement necessary to catch a ball, it helps sequence the thoughts necessary to visualize a room in your house, make a persuasive argument or think up a song. The cerebellum also coordinates attention, emotions and even social skills. The cerebellum is a primitive part of the brain that is hard at work when we learn how to do something physical. It makes up about 10% of the brain's volume and contains half of our neurons. It keeps rhythm for more than just motor activity and regulates certain brain systems so they run smoothly. Finally, the cerebellum is highly involved with the integration of information and the rate at which information is processed, all essential to thinking, learning and memory (Ratey, 2002, p. 176).

When we perform complex physical activities we are also exercising parts of the brain that are involved with the full range of cognitive function. For example, the prefrontal cortex organizes mental and physical activity. It is like the CEO of the brain performing such acts as overseeing working memory, inhibiting stimuli, initiating action, judging, planning and predicting. The prefrontal cortex works closely with the hippocampus and motor cortex (Ratey, 2008, p. 41).

The brain circuits used to order, sequence, and time a mental act are the same ones used to order, sequence, and time a physical act. The entire front half of the brain is devoted to organizing mental and physical action (e.g., working memory, motor planning, the ability to inhibit competing stimuli, thoughts, and action).

Physical and mental processes that have been mastered are stored in and executed from the brain stem, basal ganglia and cerebellum in the lower brain. Complex or new physical actions or cognitive processes are managed further up in the brain, toward the frontal cortex. This allows more neurons to be involved along the way to adjust and revise a precise final action or cognitive process (Ratey, 2002, p. 158).

Motor and cognitive functions are handled by the brain in a parallel manner (Ratey, 2002, p. 158). This accounts for why we are unable to solve a mental problem until we go for a walk or perform some physical activity. Here, we activate our motor centers to achieve a desired cognitive function.

Learning New and Challenging Movement Skills and Cognitive Development

In physical education students regularly participate in moderate to vigorous physical activity and practice new and challenging movement patterns. These two aspects of physical education make the brain better equipped to learn. The key aspects are that the movement pattern must be challenging to the student and accompanied by feedback that tells the learner what and how to improve.

When we learn how to perform a movement pattern that requires us to think deeply about what the body will do, how it will move, where it will move and with whom or what they body will move with (e.g., a social dance step, a tennis serve, a backward roll in gymnastics and so forth)

in physical education we are exercising the same areas of the brain that are involved in all of the cognitive functions used throughout the school day.

Complex physical activities put all the brain systems to use by strengthening and expanding neural networks. The more complex the bodily movements the more complex the resulting synaptic connections become. These circuits are recruited by other areas of the brain for various types of thinking (Ratey, 2008, p. 55). 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 students are learning a new motor skill in physical education 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.

Practicing an activity such as catching a ball with a lacrosse stick on the non-dominant side of the body requires the mastering and coordination of many bodily movements. When people learn to develop such movements they experience an increase in academic abilities such as memory retrieval and cognitive abilities. This is because physical and mental tasks require the same neurons to be shared increasing the likelihood of long term learning (Ratey, 2002, p. 178).

Complex physical activities and aerobic activity have distinct positive and complementary effects on the brain.

Aerobic activity and your Brain

Regular physical activity is the single most important tool you have to optimize your brain function (Ratey, 2008, p. 245). Aerobic activity elevates neural transmitters, creates new blood vessels that send growth factors and spawns new cells. Aerobic activity also improves executive function and moves more blood and nutrients into the brain.

Aerobic activity augments the number and density of blood vessels in the motor cortex and cerebellum. Exercise helps the brain become more fit. The more we move and stress our body, the better our circulation is and the more fit our brain becomes (Ratey, 2002, p. 359). Exercise produces stronger, healthier and happier brains.

The product of regular physical activity is physical fitness. Physical fitness also promotes academic achievement in the form of high scores on standardized tests.

The Relationship between Physical Fitness and Standardized Test Scores

The state departments of education in California and Texas have best demonstrated the strong relationship between a student's physical fitness and high scores on standardized tests.

California

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 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 relationship was greatest in mathematics. Further, girls at higher fitness levels demonstrated higher test scores than those of males at similar fitness levels (CDE, 2004).

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)."

California public school 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.

Texas

A study of 2.4 million Texas students in grades 3-12 from the 2007-2008 school year found that students who are physically fit are more likely to perform well on the state standardized test (i.e., the Texas Assessment of Knowledge and Skills – TAKS), have better school attendance, and are less likely to have discipline problems than their less fit peers (Texas Education Agency, 2009).

Public school K-6 students in Texas participate in 135 minutes of physical activity each week.

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Hanover Wellness Education News

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This month's edition of the news provides more evidence of the strong relationship that exists between aerobic activity, physical fitness, learning new and challenging motor patterns and cognitive development.

Physical Activity and Student Learning

The following evidence is from recent published work on the relationship of physical activity to cognitive development.

1. Physical activity and physical fitness have been shown to have positive effects on cognition and concentration (Chomitz et al, 2009).
2. Physical activity is consistently related to to higher levels of self esteem and lower levels of anxiety and stress each of which has been associated with enhanced academic performance (Chomitz et al, 2009).
3. Student attention is likely to be greater in an active rather than a sedentary student. This may facilitate favorable interaction between classroom learning and student cognition (Chomitz et al, 2009).
4. Studies have shown a significant positive relationship between physical education time and classroom grades (Chomitz et al, 2009).
5. Scoring within the healthy fitness zone on all five components of the FITNESSGRAM health related physical fitness test battery is positively correlated with passing scores on the MCAS in math and English language arts (especially in math). Similar findings were demonstrated in Illinois on their state standardized test and FITNESSGRAM (Chomitz et al, 2009).
6. Physical fitness may enhance student concentration and classroom behavior, which in turn, contributes to achievement (e.g., standardized test scores and grades) (Chomitz et al, 2009).
7. Regular exercise can alleviate stress, anxiety and depression and boost self esteem (Chomitz et al, 2009).
8. Academic achievement improves when physical education time increases. Academic achievement increases even when physical education time increases, and reduces "academic learning time." A reduction of 240 minutes per week in class time for academics to enable increased physical education led to consistently higher mathematics scores (Shephard et al, 1984; NASPE, 2001).
9. Vigorous physical activity has positive effects on academic achievement including: increased concentration; improved mathematics, reading, and writing test scores; and reduced disruptive behavior (Symons et al, 1997).
10. Regular moderate to vigorous physical activity improves memory and enhances greater connections between neurons (CSPI, 2005).
11. Exercise can decrease stress and anxiety and increase self-esteem in adolescents. Active children are less likely to smoke or use drugs and are more likely to behave well and stay in school. Research with adolescents shows that low physical activity is associated with lower fruit and vegetable consumption; higher cigarette, alcohol and marijuana use; more

time watching TV; less use of seat belts; and perception of low academic performance (Brownell and Horgen, 2004).

Effects of physical activity on the brain and learning

This article has presented much evidence from the work of Dr. John Ratey. Dr. Ratey is an associate clinical professor of psychiatry at Harvard Medical School who has written two books on neuroscience: *A User's guide to the Brain* (2002) and *Spark: The revolutionary science of exercise and the brain* (Ratey & Hagerman, 2008). Dr. Ratey is an advocate of using physical activity to promote cognitive development and for quality physical education. Here are some excerpts from his writing in support of physical activity:

1. The fact that there is constant activity in our brain and throughout our bodies tells us that movement is the ongoing life force without which we could not survive. Whether the activity is maintaining your body's temperature, ballroom dancing or learning to read, movement cannot be separated from other brain systems. A lot of brain function is essentially movement (Ratey, 2002, p. 155).
2. Movement is fundamental to the existence of a brain. Only organisms that move from place to place require a brain (Ratey, 2002, p. 156).
3. The brain's motor function is essential to the brain functions of: perception, attention, emotion, memory, thinking and learning (Ratey, 2002, p. 175).
4. Our physical movements directly influence our ability to learn, think and remember. It has been shown that certain physical activities that have a strong cognitive component, such as tennis or dance enhance social, behavioral and academic abilities. Each person's capacity to master new and remember old information is improved by biological changes in the brain brought on by physical activity. A better brain is equipped to think, remember and learn. During these periods of motor skill practice we exercise our muscles and our brains, particularly our ability to sequence motor actions and information as well as access memory (Ratey, 2002, p.178).
5. Exercise that involves learning complex movements can affect our brains in other ways. Gymnastics, dance and movements from sport (e.g., ballroom dance, dribbling with the non-dominant hand in basketball) involve a variety of coordinated movements, and practicing them causes more connections to grow between neurons. Exercise that forces us to improve balance and coordination such as those in gymnastics strengthen neural networks in the cerebellum, which is the area responsible for balance, physical coordination and for coordinating our social interactions. This type of motor activity also affects the basal ganglia and corpus callosum, improving memory and increasing the ability to master new information (Ratey, 2002, p. 360).
6. All brain functions are descendants of movement. To improve our brains we have to move our bodies, take action and get going (Ratey, 2002, p. 363).
7. Motor development in infants, especially during the crawling stage of locomotor development, has been found to be of vital importance in the development of learning readiness for reading and writing (Ratey, 2002, p. 179).
8. In 2004, a panel of researchers from the fields of kinesiology to pediatrics reviewed over 850 studies on the effects of physical activity and school children. The committee

reported that physical activity has a positive influence on memory, concentration and classroom behavior (Ratey, 2008, p. 22).

9. Physically fit kids have the ability to learn from mistakes. These students can consider a response to a test question and use the experience of a wrong choice as a guide in making the next decision (Ratey, 2008, p. 26).

Summary

Two of the many benefits of participation in physical education include moderate to vigorous physical activity and developing new and complex movement patterns. These two physical education components equip your brain to think, remember, plan, solve problems and learn throughout the school day. Regular participation in physical education with a highly qualified physical educator can help students build, strengthen and expand neural networks, which in turn, improves cognition.

K-6 students should participate in at least 150 minutes of quality physical education each week. Students in grades 7-12 should participate in 225 minutes of quality physical education each week (NASPE, 2004). Finally, if students participate in daily physical education they can achieve a health enhancing level of physical fitness. This can contribute to further cognitive benefits.

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Hanover Wellness Education News

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Let's Move

The White House has created an initiative called Let's Move in order to reshape the way American youth eat and play in order to eliminate childhood obesity within a generation (Stolberg, 2010). Let's Move (2010) has four components: healthy choices, healthier schools, physical activity, and accessible and affordable healthy food. This month's issue will discuss the third component – physical activity.

What are the Physical Activity guidelines for Youth (U. S. Department of Health and Human Services, 2008)?
Children and adolescents should do 60 minutes (1 hour) or more of physical activity daily.
Aerobic: Most of the 60 or more minutes a day should be either moderate- or vigorous-intensity aerobic physical activity, and should include vigorous-intensity physical activity at least 3 days a week.
Muscle-strengthening: As part of their 60 or more minutes of daily physical activity, children and adolescents should include muscle-strengthening physical activity on at least 3 days of the week.
Bone-strengthening: As part of their 60 or more minutes of daily physical activity, children and adolescents should include bone-strengthening physical activity on at least 3 days of the week.
It is important to encourage young people to participate in physical activities that are appropriate for their age, that are enjoyable, and that offer variety.

Why should we move (Schardt, 2009)**?**

- Physical activity is central to reducing risk of developing cancer. The American cancer society recommends at least 30 minutes of moderate to vigorous physical activity at least five days per week. However, 45-60 minutes is preferable.
- Increased blood flow to the brain stimulates the growth of new brain cells, new connections or synapses between cells and new capillaries to distribute the blood and its nutrients.
- Aerobic exercise increases the supply of a protein called brain derived neurotrophic factor or BDNF which protects brain neurons and promotes growth of new nerve cells and synapses that are related to learning and memory. BDNF is active in the hippocampus, an area essential for relational memory (the ability to make connections among bits of information and to navigate in space).
- Aerobic exercise and strength training improve insulin sensitivity. Insulin is a hormone that allows blood sugar to enter the body's cells where its stored or used as fuel. As we age, or gain weight, our bodies don't respond as well to insulin and can become insulin resistant. Insulin resistance increases the risk of heart disease and if blood sugar levels continue to rise, type 2 diabetes.
- People who sit for the majority of their day have much higher mortality rates than people who don't. These people are at increased risk for metabolic syndrome (risk factors that include a large waist, elevated blood pressure and blood triglycerides). Those with excess adiposity around the waistline are more likely to have visceral fat. This accumulates around organs deep inside the belly. It is linked to insulin resistance, heart disease and diabetes.
- Exercise lowers the risk of stroke and heart disease
- Active people are 15 to 25% less likely to be diagnosed with depression than inactive people.
- Forty minutes of moderate to vigorous aerobic exercise 3-5 times per week lowers systolic blood pressure by 2-5 points
- Aerobic exercise increases the size, number and activity of mitochondria (fat burning centers of your muscle cells). Mitochondria do not function as well in people who are older, obese, or diabetic.

What about strength training for youth?
Progressive resistance training (PRT) is the best type of training for muscles fitness (muscular strength and muscular endurance). The term PRT is used because the frequency, intensity and length of time of muscle overload are progressively increased as muscle fitness increases. PRT is exercise done against a resistance.

PRT can be a safe, effective and beneficial method of exercise to build health muscles, joints and bones for all youth. The qualified acceptance of youth PRT by medical and fitness organizations has become almost universal. The benefits of PRT include increased: muscular strength and endurance; bone mineral density; fortify the ligaments and tendons that support muscles; reduced risk of sports related injuries; and improved body composition and blood lipid profile.

If your child is ready to participate in organized sports (e.g., gymnastics, football, basketball, baseball, soccer) it is usually safe to begin strength training. This training program should not a scaled down adult strength training program.

General youth resistance training guidelines (American Academy of Pediatrics, 2008; Faigenbaum & Westcott, 2007)

- Strength training programs for preadolescents and adolescents are safe and effective if proper resistance training techniques and safety precautions are followed
- Youth should receive qualified instruction and supervision
- Begin learning exercise technique with no (or very little) resistance
- Ensure the exercise environment is safe and free of hazards
- Begin each session with a 5-10 minute dynamic warm up
- Perform 10-15 (if the resistance cannot be moved ten times with proper form the resistance is too great) repetitions on a variety of exercises for major muscle groups 2-3 times per week on nonconsecutive days
- The number of sets can be increased up to three
- Each repetition should last four to six seconds with a full range of motion with a one to two minute rest period between sets
- Focus on correct exercise technique instead of the amount lifted
- Strength training sessions should last approximately 20-30 minutes
- Cool down with low intensity activities and static stretching
- Preadolescents and adolescents should avoid competitive weight lifting, power lifting body building and maximal lifts until they reach physical and skeletal maturity

When inactive people begin a physical activity program they should start low and go slow by gradually increasing how often and how long activities are done

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

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http://www.cdc.gov/healthyweight/assessing/bmi/

Hanover Wellness Education News

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What is Junk Food?

Sometimes commerce can encourage organizations to promote food that they believe will be appealing to consumers and sell (i.e., those that are high in added sugars, artificial ingredients, salt, and saturated and trans fatty acids, and low in vitamins, minerals and dietary fiber) rather than on foods that will promote health and student learning (e.g., whole foods such as whole grains, legumes, nuts, seeds, eggs, vegetables, fruit, lean meats, fish, tofu, plain yogurt, cheese, and so on). This month's issue of the wellness news offers information that will help you consider two essential (dietary) questions –

What is junk food?
And
Can junk food be considered food?

The question of what is a junk food is best answered by answering another question – What is not a junk food? Whole foods are not junk foods. Whole foods are those that have not been processed or refined and do not contain any additives (e.g., fruit, vegetables, legumes, and so forth). Some may consider a food whole when it is processed or refined as little as possible.

Here is an attempt at a definition of a junk food. A junk food is a food high in trans fatty acids, saturated fatty acids, artificial ingredients, salt, and or sugar that has a low level of vitamins and minerals. These are foods with little or no nutritional value. These foods include, but are not limited to: confections (sugar based food), cookies (high in sugar and often are high in trans fats), cakes/cupcakes (high in sugar and often high in trans fats), pies (high in sugar, sometimes high in trans fats), flavored/sugared milk (added sugars, hormones), doughnuts (high in sugar, trans fats, saturated fats, sodium and calories), chips (high in sodium, trans fats and saturated fats), French fries (high in sodium, trans fats and saturated fats) hot dogs (high in saturated fat and sodium), some commercially prepared pizza (high in saturated fat and sodium), carbonated beverages (usually 7-9 teaspoons of sugar per 12 oz), ice cream (high in sugar and saturated fat), frozen yogurt (sugar based food) and fruit flavored drinks (high in sugar, non 100% juices often contain high fructose corn syrup).

- **Saturated fat**: raises "bad" (LDL) cholesterol. Americans should consume less than 10% of calories from saturated fat.
- **Artificial ingredients**: FD & C (Food, drug and cosmetic) colors such as Green #3, Blue #1, Blue #2, Red #3, Yellow #6, preservatives, acesulfame potassium, aspartame, benzoates, BHA (butylated hydroxyanisole), BHT (butylated hydroxytoluene), MSG, nitrites/nitrates, parabens, and sulfites (Winter, 2005; CSPI, 2006; USDA, 2005) cyclamate, hydrogenated vegetable oil, olestra,

partially hydrogenated vegetable oil, potassium bromate, propyl gallate, saccharin, sodium nitrate/nitrite.

- **Trans fat**: Consumption of trans fats is strongly associated with coronary artery disease. They raise bad cholesterol and lower good cholesterol. The only safe level is 0. Much of the trans fats that Americans consume are in commercially prepared cakes, cookies, crackers, breads and so forth (Willett, 2005).
- **Salt (high levels)**: the National Institute of Medicine recommends 1,500 mg of salt per day. Dr. Walter Willett (Harvard Medical School, nutrition chair) states that our body requires only 1 gram of salt for optimal functioning. The relationship between salt intake and blood pressure is direct and progressive with no apparent threshold (Nestle, 2006).
- **Added sugars**: Added sugars are sugars and syrups that are added to foods or beverages during processing or preparation. This does not include naturally occurring sugars such as those that occur in milk and fruits. Foods that contain most of the added sugars in American diets are: regular soft drinks, candy, cakes, cookies, pies, fruit drinks, such as fruitades and fruit punch, milk-based desserts and products, such as ice cream, sweetened yogurt and sweetened milk, grain products such as sweet rolls and cinnamon toast. Other names for sugar include – brown sugar, corn sweetener, corn syrup, dextrose, fructose, fruit juice concentrates, glucose, high fructose corn syrup, honey, invert sugar, maltose, lactose, malt syrup, molasses, raw sugar, sucrose, sugar, syrup. There is no daily sugar recommendation for added sugars; sugars simply provide calories and nothing more.

JUNK FOOD AT SCHOOL

Children who follow poor dietary patterns are more likely to experience: shortened attention span, mood changes, fatigue, impaired reasoning and judgment, and lower scores on standardized tests. Conversely, students who follow healthy diets feel better and are more likely to perform at higher levels on all measures of school achievement. A lack of physical activity and poor nutrition can lead to overweight, obesity, high blood pressure, heart disease, type 2 diabetes, absenteeism, anxiety, stress and decreases in academic achievement (CDC, 2005; Ludwig et al, 2001; Schwimmer et al, 2003; Gibson & Green, 2000; ASFSA, 1989; Parker, 1989; Brown and Pollitt, 1996; Alaimo, 2001, Tufts University, 1995; Pollitt et al, 1991). The following bullet points contain information about the relationship of consumption of foods of minimal nutritional value to health and student learning.

JUNK FOOD CONTRIBUTES TO DIABETES, CORONARY HEART DISEASE AND CANCER

1. Refined carbohydrate intake influences control over blood sugar and in turn, the development of diabetes. A diet high in refined carbohydrates that are quickly digested and absorbed can have damaging consequences. These include higher levels of blood sugar, insulin, and triglycerides, and lower levels of HDL (the “good”) cholesterol (Willett, 2005).

2. 33% of boys and 39% of girls born in 2000 will develop diabetes at some point during their lifetime. As obesity rates increase so will the incidence of diabetes (Narayan, 2003).

3. The digestive system breaks simple carbohydrates such down quickly into sugar molecules. Blood sugar and insulin levels rise quickly and peak at high level resulting in a quick return of hunger (Willett, 2005).

4. Chronically high levels of blood sugar and insulin are not good for you. They contribute to many of the complications of diabetes, such as nerve damage, loss of vision, kidney disease, and wounds that won't heal. Some research suggests that excess blood sugar and insulin may contribute to breast cancer, colon cancer and polycystic ovary syndrome (Willett & Skerrett, 2005).

5. The well documented negative physiologic and metabolic effects of consuming a high level of refined carbohydrates such as sugar includes the elevation of triglyceride levels and of blood pressure and the lowering of high density lipoprotein (HDL) cholesterol (the good cholesterol) levels, which would be expected to raise the risk of developing coronary heart disease (Brownell et al, 2009).

6. One third of cancer deaths could be prevented by healthy diets (Block et al, 1992)

GOOD NUTRITION IS RELATED TO LEARNING AND ACHIEVEMENT

1. Carbohydrate rich and protein poor meals have a sedative effect on children (Gibson & Green, 2002).

2. Meals high in protein are associated with an increase in reaction time in children (Gibson & Green, 2002).

3. Meals high in fat are associated with a decline in alertness in children (Gibson & Green, 2002).

4. Those having the lowest amount of protein in their diet had the lowest achievement scores (ASFSA, 1989).

5. Children who suffer from poor nutrition during the brain's most formative years score much lower on tests of vocabulary, reading comprehension, arithmetic, and general knowledge (Brown and Pollitt, 1996).

6. Improved nutrition in early childhood has important long term effects in the adolescent and adult (Martorell, 1995).

7. Even moderate under nutrition can have lasting effects and compromise cognitive development or school performance (Tufts University, 1995).

8. The American dietetic association (Stang & Bayerl, 2003) states that malnutrition has been linked to delayed physical, psychosocial and cognitive development and is now recognized as a major contributor to the growing problem of overweight and obesity in the child and adolescent population.

AMERICAN CHILDREN HAVE POOR DIETS

1. Americans consume an average of 152 pounds of sugar annually (Brownell and Horgen, 2004).

2. The average 6 to 11-year-old eats only 3.5 servings of fruits and vegetables a day, achieving only half the recommended seven servings per day for this group (USDHHS, 1994)

3. Fewer than 15% of elementary school aged children eat the recommended five or more servings of fruit and vegetables daily (USDHHS, 1994). On any given day, 45% of children eat no fruit, and 20% eat less than one serving of vegetables (USDHHS, 1994)

4. There is only a 2% chance that a school aged child will consume the recommended number of daily servings from the USDA food pyramid on any given day (USDA, 2002).

5. People who eat diets high in sugar get less calcium, fiber, folate, vitamin A, vitamin C, vitamin E, zinc, magnesium, iron, and other nutrients. They also consume fewer fruits and vegetables (CSPI, 2005).

6. When fruit and vegetable consumption increases risk of cancer, diabetes, heart disease and hypertension decreases (National Cancer Institute, 2006).

MAKING JUNK FOOD AVAILABLE INCREASES A PREFERENCE FOR MORE JUNK FOOD

1. Sugary foods may have negative effects on taste preferences and food acceptance. People who habitually consume sugary foods may find more satiating but less sweet foods (e.g., vegetables, legumes and fruits) unappealing or unpalatable resulting in a low quality diet (Brownell et al, 2009). Children learn preferences for foods that are made available to them, including those food choices that are unhealthy (Birch, 1999).

2. “Young children may lack the maturity to make healthy and safe food choices.” (Wechsler, et al, 2001, School health programs and policy study).

3. Even small nutritional deficiencies promote personality, mood changes, and impaired reasoning and judgment. Eating nutrient rich foods may also increase intelligence (Ratey, 2002).

Things to Consider about Junk Food (summary)

1. Eating junk food can increase a preference for more junk food and reinforce unhealthy eating patterns
2. Consuming junk food can promote dental caries
3. Consuming junk food can promote overeating, which in turn, promotes overweight and obesity
4. Providing junk food undermines healthy diets since eating junk food can push healthy food out of the diet.
5. The blood sugar and insulin level spikes that result from consuming high sugar junk foods can contribute to the quick return of hunger.
6. Consuming junk food can contribute to high blood pressure and coronary artery disease.
7. American schools that provide junk food to learners may be contradicting themselves by undermining healthy eating concepts in health education.
8. Learners who eat junk food in school may have shortened attention spans, changes in mood, fatigue, impaired reasoning and judgment. They will also be more likely be absent from school and suffer from anxiety and stress. These conditions can result in lower scores on high stakes standardized tests and diminished achievement of curricular goals.
9. Healthy food will only be eaten when junk food is not available since children are seldom positively influenced by a food's relationship to health or disease prevention.

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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This month's issue will discuss physical activity guidelines, health related physical fitness and the results of physical fitness testing at the Cedar School.

Many fitness experts believe that measuring physical activity levels are a more important measure of health related fitness than fitness tests themselves (Rowland & Freedson, 1994; Siedentop, 2004). Physical fitness can neither be achieved nor maintained without regular physical activity.

How Much Physical Activity Do Children Need?

Key Guidelines for Children and Adolescents from the U.S. Department of Health and Human Services.

Children and adolescents should do 60 minutes (1 hour) or more of physical activity daily.

Aerobic: Most of the 60 or more minutes a day should be either moderate- or vigorous-intensity aerobic physical activity, and should include vigorous-intensity physical activity at least 3 days a week.

Muscle-strengthening: As part of their 60 or more minutes of daily physical activity, children and adolescents should include muscle-strengthening physical activity on at least 3 days of the week.

Bone-strengthening: As part of their 60 or more minutes of daily physical activity, children and adolescents should include bone-strengthening physical activity on at least 3 days of the week.
It is important to encourage young people to participate in physical activities that are appropriate for their age, that are enjoyable, and that offer variety.

Physical Activity and Student Learning

The following evidence (Chomitz et al, 2009) highlights the relationship of physical activity to cognitive development.

1. Physical activity and physical fitness have been shown to have positive effects on cognition and concentration.
2. Physical activity is consistently related to to higher levels of self esteem and lower levels of anxiety and stress each of which has been associated with enhanced academic performance.

3. Student attention is likely to be greater in an active rather than a sedentary student. This may facilitate favorable interaction between classroom learning and student cognition.
4. Studies have shown a significant positive relationship between physical education time and classroom grades.
5. Scoring within the healthy fitness zone on all five components of the FITNESSGRAM health related physical fitness test battery is positively correlated with passing scores on the MCAS in math and English/language arts (especially in math). Similar findings were demonstrated in Illinois on their state standardized test and FITNESSGRAM.

What is Physical Fitness?

Physical fitness is a state of well being that:

- Allows the vigorous performance of daily life activities
- Permits one to respond to emergencies when necessary
- Reduces the risk of chronic diseases and other health problems related to a lack of physical activity and exercise
- Helps maintain optimal function of body systems
- Establishes a sound base for participation in a variety of physical activities

What is Health Related Fitness?

There are five components of health related fitness. They include cardio-respiratory fitness, muscular strength, muscular endurance, flexibility and body composition. Having a moderate amount of each component of health related fitness is essential to disease prevention and health. It is not essential to have extremely high levels of fitness to attain health benefits. High levels of health related fitness relate more to performance than health benefits. For instance, moderate amounts of strength are necessary to prevent back and posture problems. A high level of strength improves performance in physical activities like wrestling and football and occupations that involve heavy lifting.

Cardiorespiratory Fitness

Cardio-respiratory fitness is the ability of the heart, blood vessels, blood and respiratory system to supply fuel and oxygen to the muscles and the ability of the muscles to utilize fuel to allow sustained exercise. A fit person can persist in physical activity for relatively long periods of time.

Cardio-respiratory fitness has many synonyms including cardiovascular fitness, cardiovascular endurance, aerobic fitness, aerobic endurance and aerobic capacity. The term cardio-respiratory is used because it represents the cardiovascular and respiratory system working together.

Muscular Strength and Muscular Endurance

Muscular strength is the ability of the muscles to exert an external force or to lift a heavy weight. A fit person can do work or play that involves exerting force, such as lifting or controlling one's own body weight. Muscular endurance is the ability of the muscles to exert themselves repeatedly. A fit person can repeat movements for a long period of time.

Flexibility

Flexibility is a measure of the range of motion available at a joint or group of joints. It is determined by the shape of the bones and cartilage in the joint, and by the length and extensibility of muscles, tendons and ligaments that go across the joint (Corbin et al, 2004). Together muscles and tendons are known as a muscle- tendon unit or MTU. A fit person can move the body joints through a full range of motion. Flexibility is not the same thing as stretching. Stretching is the major technique used to improve flexibility.

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 & Hager, 2006). Body mass composition assessment is often done through skinfold measurements and bio-electrical impedance (Vehrs & Hager, 2006). Some use body mass index (BMI) as a body composition alternative.

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. Body composition is not part of Cedar school fitness testing.

We use the tests in the table below to measure health related fitness.

FITNESSGRAM HEALTH RELATED FITNESS TEST BATTERY	
Test item	Description
Mile Run	Students attempt to travel one mile as fast as possible. This test measures cardio-respiratory endurance.
PACER	Progressive Aerobic Cardiovascular Endurance Run. Students attempt to run as many 20 meter laps as possible. Each minute the amount of time the students have to run the distance diminishes. This test measures cardio-respiratory endurance.
Push ups	Students attempt to perform as many push ups as possible - one push ups every three seconds with legs and back straight. The body is lowered until the arms achieve ninety degree angles. This test measures upper body muscular strength and muscular endurance.
Sit ups	Students attempt to perform one sit up ever three seconds with knees bent. This item measures abdominal muscular strength and muscular endurance.
Sit and reach	Students attempt to reach with both hands on a sit and reach box as far as possible. They receive one score for each side of the body. This test measures the flexibility of the hamstring muscles.

Trunk lift	Students lie on their stomach and attempt to lift their chin as high as possible (up to 12 inches). This test measures low back muscular strength and muscular endurance and low back flexibility.

Physical Fitness in young children is largely dependent on Growth and Maturation

Children and adolescents who are regularly physically active will achieve fitness to the extent that heredity, maturation and other physiological factors (such as skeletal age) will allow (Welk & Meredith, 2008). Studies that have examined skeletal age (Gruelich & Pyle, 1959; Krahenbuhl & Pangrazi, 1983; Welk & Meredith, 2008) show that a 5-6 year variation in skeletal maturity exists in a typical elementary classroom. For example a group of 8-year-old students (chronologically) can range in skeletal age from 5-11-years. This means that children who have a skeletal age of five years are trying to keep up with those whose skeletal age is 11 years.

Awards that are given to students with elite fitness scores often go to those who mature early and/or have strong genetic predispositions. It is more appropriate to provide recognition to those who demonstrate participation in regular physical activity.

Fitness Levels of Cedar School Students

The tables below show the percentages of fourth grade students who scored within, above and below the healthy fitness zone for each health related test item.

2009-2010 FITNESSGRAM Results - 4th Grade Boys (60)						
	Mile run/walk	**PACER**	**Push-ups**	**Sit-ups**	**Sit & Reach**	**Trunk Lift**
HFZ	9:00-11:30	23-61 laps	7-20	12-24	8”	9-12”
Above HFZ	38% (⇑ 11:30)	5%	5%	6%	32%	
Within HFZ	43%	63%	43%	47%	28%	100%
Below HFZ	9%	32%	52%	47%	40%	

2009-2010 FITNESSGRAM Results - 4th Grade Girls (41)						
	Mile run/walk	**PACER**	**Push-ups**	**Sit-ups**	**Sit & Reach**	**Trunk Lift**
HFZ	9:30-12:30	15-41 laps	7-15	12-26	9”	9-12”
Above HFZ	44% ⇑ (12:30)	0	0	5%	59%	
Within HFZ	56%	83%	27%	32%	20%	100%
Below HFZ	0	17%	73%	63%	21%	

2009-2010 FITNESSGRAM Results - 4th Grade (Boys and Girls)						
	Mile run/walk	**PACER**	**Push-ups**	**Sit-ups**	**Sit & Reach**	**Trunk Lift**
Above HFZ	41%	3%	3%	6%	42%	
Within HFZ	48%	71%	37%	41%	25%	100%
Below HFZ	11%	26%	60%	53%	33%	

The Relationship between Physical Fitness and Standardized Test Scores

The state departments of education in California and Texas have best demonstrated the strong relationship between a student's physical fitness and high scores on standardized tests.

California

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 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 relationship was greatest in mathematics. Further, girls at higher fitness levels demonstrated higher test scores than those of males at similar fitness levels (CDE, 2004).

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)."

California public school 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.

Texas

A study of 2.4 million Texas students in grades 3-12 from the 2007-2008 school year found that students who are physically fit are more likely to perform well on the state standardized test (i.e., the Texas Assessment of Knowledge and Skills – TAKS), have better school attendance, and are less likely to have discipline problems than their less fit peers (Texas Education Agency, 2009).

Public school K-6 students in Texas participate in 135 minutes of physical activity each week.

Summary

Children and adolescents will achieve and maintain a health enhancing level of physical fitness to the extent that they are sufficiently regularly physically active. Helping students develop physical fitness is only one goal for physical education. Here, students develop competent movement patterns, learn to participate in regular physical activity, exhibit responsible personal and social behavior, and value physical activity for its contribution to a healthy lifestyle.

Cedar School students participate in ninety minutes of physical education per week. This time does not provide enough time to develop physical fitness. K-6 students should participate in at least 150 minutes of quality physical education each week. Students in grades 7-12 should participate in 225 minutes of quality physical education each week (NASPE, 2004). Regular physical activity and physical fitness contribute to cognitive benefits such as proficient standardized test scores.

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Safe Drinking Water

The next two issues of the wellness news will discuss safe drinking water. The information contained in these issues is from the Environmental Protection Agency (EPA, 2009).

People who travel internationally know the problem of unsafe drinking water. At home, we hardly give it a thought. Drinking water is constantly under siege from naturally occurring events and human activities that can pollute our sources of drinking water.

Here are some facts about our drinking water:

- In the United States, water utilities treat nearly 34 billion gallons of water every day
- In the United States and Canada, the total miles of water pipeline and aqueducts equal approximately one million miles; enough to circle the globe 40 times.
- Americans drink more than one billion glasses of tap water per day
- Children in the first six months of life consume seven times as much water per pound as the average American adult.

Are there any federal laws relative to safe drinking water?

Safe Drinking Water Act (SDWA)

The Safe Drinking Water Act (SDWA) is the main federal law that ensures the quality of Americans' drinking water.Under SDWA, EPA sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards. SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and ground water wells. SDWA does not regulate private wells which serve fewer than 25 individuals.

The SDWA defines a public water system (PWS) as one that serves piped water to at least 25 persons or 15 service connections for at least 60 days each year. There are approximately 161,000 public water systems in the United States.) Such systems may be publicly or privately owned. Community water systems (CWSs) are public water systems that serve people year-round in their homes. Most people in the U.S. (268 million) get their water from a community water system. EPA also regulates other kinds of public water systems, such as those at schools, campgrounds, factories, and restaurants. Private water supplies, such as household wells that serve one or a few homes, are not regulated by EPA.

Where Does My Drinking Water Come From And How Is It Treated?

Your drinking water comes from surface water or ground water. The water that systems pump and treat from rivers, lakes, and reservoirs is known as surface water. Water pumped from wells drilled into underground aquifers, geologic formations containing water, is called ground water. The quantity of water produced by a well depends on the nature of the rock, sand, or soil in the aquifer from which the water is drawn. Drinking water wells may be shallow (50 feet or less) or deep (more than 1,000 feet). More water systems have ground water than surface water as a source, but more people drink from a surface water system. Large water supply systems tend to rely on surface water resources, while smaller water systems tend to use ground water. Your water utility or public works department can tell you the source of your public water supply (EPA, 2010).

How Does Water Get To My Faucet?

An underground network of pipes typically delivers drinking water to the homes and businesses served by the water system. Small systems serving just a handful of households may be relatively simple, while large metropolitan systems can be extremely complex-sometimes consisting of thousands of miles of pipes serving millions of people. Drinking water must meet required health standards when it leaves the treatment plant. After treated water leaves the plant, it is monitored within the distribution system to identify and remedy any problems such as water main breaks, pressure variations, or growth of microorganisms.

How Is My Water Treated To Make It Safe (EPA, 2010)?

Water utilities treat nearly 34 billion gallons of water every day. The amount and type of treatment applied varies with the source and quality of the water. Generally, surface water systems require more treatment than ground water systems because they are directly exposed to the atmosphere and runoff from rain and melting snow.

Water suppliers use a variety of treatment processes to remove contaminants from drinking water. These individual processes can be arranged in a "treatment train" (a series of processes applied in a sequence). The most commonly used processes include coagulation (flocculation and sedimentation), filtration, and disinfection. Some water systems also use ion exchange and adsorption. Water utilities select the treatment combination most appropriate to treat the contaminants found in the source water of that particular system.

Glossary

Aquifer: A natural underground layer, often of sand or gravel, that contains water.

Coliform: A group of related bacteria whose presence in drinking water may indicate contamination by disease-causing microorganisms

Contaminant: Anything found in water (including microorganisms, radionuclides, chemicals, minerals, etc.) which may be harmful to human health

Cryptosporidium: Microorganism found commonly in lakes and rivers which is highly resistant to disinfection.

Disinfectant: A chemical (commonly chlorine, chloramines, or ozone) or physical process (e.g., ultraviolet light) that kills microorganisms such as viruses, bacteria, and protozoa

Ground Water: Water that is pumped and treated from an aquifer

Inorganic Contaminants: Mineral-based compounds such as metals, nitrates, and asbestos; naturally occurring in some water, but can also enter water through human activities

Microorganisms: Tiny living organisms that can be seen only under a microscope; some can cause acute health problems when consumed in drinking water

Organic Contaminants: Carbon-based chemicals, such as solvents and pesticides, which enter water through cropland runoff or discharge from factories

Pathogen: Disease-causing organism

Septic System: Used to treat sanitary waste; can be a significant threat to water quality due to leaks or runoff

Source Water: Water in its natural state, prior to any treatment for drinking (i.e., lakes, streams, ground water)

Surface Water: Water that is pumped and treated from sources open to the atmosphere, such as rivers, lakes, and reservoirs

Watershed: The land area from which water drains into a stream, river, or reservoir

Well: A bored, drilled or driven shaft whose depth is greater than the largest surface dimension, a dug hole whose depth is greater than the largest surface dimension, an improved sinkhole, or a subsurface fluid distribution system

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How Do We Use Drinking Water In Our Homes?

The information from this month's issue of the wellness news comes from the Environmental Protection Agency (EPA, 2009).

Only one percent of all the world's water can be used for drinking. Nearly 97% of the world's water is salty or otherwise undrinkable, and the other two percent is locked away in ice caps and glaciers. There is no "new" water: whether our source water is a stream, river, lake, spring, or well, we are using the same water the dinosaurs used millions of years ago.

The average American uses about 90 gallons of water each day in the home, and each American household uses approximately 107,000 gallons of water each year. For the most part, we use water treated to meet drinking water standards to flush toilets, water lawns, and wash dishes, clothes, and cars. In fact, 50-70 percent of home water is used for watering lawns and gardens. Nearly 14 percent of the water a typical homeowner pays for is never even used-it leaks down the drain.

How Much Water Do Homes In The U.S. Use Compared To Other Countries?

Americans use much more water each day than individuals in both developed and undeveloped countries: For example, the average European uses 53 gallons; the average Sub-Saharan citizen, 3-5 gallons .

Water efficiency plays an important role in protecting water sources and improving water quality. By using water wisely, we can save money and help the environment. Water efficiency means using less water to provide the same benefit. Using water-saving techniques could save you hundreds of dollars each year, while also reducing the amount of pollutants entering our waterways.

How Do Drinking Water Utilities Conserve Water?

Water utilities forecast water source availability, growth in population, and water demand to ensure adequate future water supplies during normal conditions, as well as periods of drought. When water shortages are predicted or experienced, water utilities have many options for conserving water. Temporary cutbacks or permanent operating adjustments can help conserve water.

Temporary cutbacks may include:

- Reduction of system-wide operating pressure, and
- Water use bans, restrictions, and rationing.
- Permanent conservation measures may include:

- Subsidizing use of water-efficient faucets, toilets, and showerheads,
- Public education and voluntary use reduction,
- Billing practices that impose higher rates for higher amounts of water use,
- Building codes that require water-efficient fixtures and appliances,
- Leak detection surveys and meter testing, repair, and replacement, and
- Reduction in use and increase in recycling of industrial water.

How Can I Conserve Water?

The national average cost of water is about $2.00 per 1,000 gallons. The average American family spends about $474 each year on water and sewage charges. American households spend an additional $230 per year on water heating costs. By replacing appliances such as the dishwasher and inefficient fixtures such as toilets and showerheads, you can save a substantial amount each year in water, sewage, and energy costs.

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