Understanding the New Healthy Fitness Zone® Tables

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In the State of California, the physical performance test (PFT) is administered to students in grades 5, 7, and 9 during the testing window, February through May. The California State Board of Education has identified the FITNESSGRAM® as the PFT and adopted the new Healthy Fitness Zones® (HFZs®) for body mass index (BMI) and aerobic capacity for the 2011 testing. The California Department of Education, CDE, has sponsored a PFT Website, www.pft-info.org, that focuses on appropriate test administration that follows California Education Code. It is imperative that teachers/coaches administer the FITNESSGRAM® subtests with fidelity to ensure reliable and valid results.

The Centers for Disease Control and Prevention (CDE) have reported BMI scores, relative relationship of weight to height, for years and have used these data to chart the obesity epidemic throughout the United States over the past three decades. Parents are familiar with growth charts doctors use to indicate if a child is in the normal range for height and weight. The FITNESSGRAM®, a health-related assessment, indicates the HFZ® for BMI by age and gender. Prior to the new BMI HFZs®, physical educators reported that it was easier to be considered healthy using the FITNESSGRAM® standards than the CDC standards. The CDC BMI standards reflect the normal range of the 1980s. The new HFZs® for the FITNESSGRAM® reflect the recent work of the FITNESSGRAM® Scientific Committee that looked at BMI and the level of blood test indicators (i.e. HDL cholesterol, LDL cholesterol, and triglycerides) associated with preventable disease to adjust the HFZs® for BMI. Interestingly, the two measures are now in much greater alignment.

The new BMI HFZs® have not received the same scrutiny as those for aerobic capacity. Teacher reactions over the new aerobic capacity HFZs® have spanned from disbelief to anger to frustration. Many feel the new zones are unfair and punitive for students with a high BMI. They feel frustration; they can no longer simply motivate students by telling them the mile time or number of PACER® the student must run to be in the HFZ®.

This frustration stems from the fact that educators typically give performance-based tests to measure student knowledge and abilities. Performance testing is prevalent...
in physical education as exemplified by the following measures: number of repetitions, distance, time, height (jumped), weight (lifted), motor skill form, explanation of a concept, and number of questions answered correctly. The new FITNESSGRAM® HFZ® tables for aerobic capacity represent a true paradigm shift from performance measures to a more accurate prediction of system function and efficiency. While the former aerobic capacity HFZs® “predicted” the function and efficiency of the cardio-respiratory system, the new tables predict Max VO₂ using BMI and are a better prediction of the function and efficiency of the cardio-respiratory system.

If teachers continue to use a performance-based perspective, these tables appear to be punitive for students with a high BMI as a lean student can reach the HFZ® for aerobic capacity by running a slower mile or by running fewer PACER® laps than a student with a higher BMI score. Initially, the tables seem unfair for students with high BMI scores as our viewpoint has not shifted. Students, parents, and educators need to be educated regarding aerobic capacity and the science behind the new tables so that they may better understand the implied health consequences of a higher BMI.

The FITNESSGRAM® includes two test options (mile run and PACER®) which predict aerobic capacity for students based upon age, gender, and BMI, the relationship of weight to height, and one test option (mile walk for ages 13 and older) which predicts aerobic capacity for students using the Rockport Walk Test formula which factors in age, gender, weight, time walked, and heart rate. The critical change is that Max VO₂ is now being predicted and this level indicates aerobic capacity.

So, how do you define aerobic capacity? How do students, parents, and administrators define it? Some may reply that it is an indicator of heart health, efficiency of the cardio-respiratory system, or it is a synonym for fitness. Others may say it is a score you get on the FITNESSGRAM® test. Still others will look at you with a blank stare and may only be able to state that when they go to an aerobics class they work out and get sweaty. Simplified explanations of aerobic metabolism, anaerobic metabolism, aerobic capacity, and the effects of fat on aerobic metabolism follow and may be helpful in explaining these processes to students, parents, and non-physical educators.

**Student/Parent/Non-Physical Educator Simplified Explanations**

Aerobic capacity is a measure of the body’s ability to use aerobic metabolism when creating movement by converting glucose (simple sugar) into “energy” at the cellular level through a series of chemical reactions that utilize oxygen. A muscle using aerobic metabolism can move for a longer period of time, working at the same load and intensity, than a muscle that is converting glucose into “energy” through a series of chemical reactions that do not use oxygen, anaerobic metabolism. When our bodies use anaerobic metabolism to create movement, byproducts are formed that make the muscle feel sore; muscle cells fatigue as glucose cannot be converted into “energy” without oxygen for a long period of time.
Aerobic capacity can be simply explained as the body’s ability to convert glucose into energy at the cellular level through a series of chemical reactions using oxygen that result in movement until there is insufficient oxygen required for the workload and intensity. Once there is insufficient oxygen, the metabolic process shifts primarily to anaerobic metabolism. To deliver the oxygenated blood to the muscles requires an efficient cardio-respiratory system that includes a heart that has a greater stroke volume potential, efficient exchange of gases within the lungs, and sufficient capillaries to carry the blood to the muscles. The point at which the muscle cells no longer have sufficient oxygen to convert glucose into energy to perform the required workload and intensity signals the maximal volume uptake of oxygen: Max VO2. At this point, anaerobic metabolism becomes the primary metabolic process used until the muscle tissues fatigue.

When someone has a higher BMI, he/she weighs more than someone given the same height. Body weight is comprised of skeletal and organ weight, lean muscle mass, and fat tissue. Individuals with higher BMIs, especially preadolescent children, have more fat cells than someone with a lower BMI. Those individuals who have extensive muscle mass, i.e. body builders, will also have a higher BMI. In both of these instances, a greater blood supply is required to support the additional fat or muscle tissue and result in increased capillaries.

Muscular movement results from both aerobic and anaerobic metabolism occurring at the same time. When the primary source of metabolism is aerobic (using oxygen), the person can continue to move for a longer period of time moving at the same workload and intensity. People can walk for hours while visiting a local county fair; few can run for hours around a track. The FITNESSGRAM® Scientific Committee used a mathematical formula that predicts aerobic capacity based upon a person’s age, gender, and BMI for the mile run and PACER®. The new Healthy Fitness Zone® charts simply indicate that someone who is leaner has a more efficient system that can absorb oxygen from the lungs, move the oxygenated blood more quickly to the muscles, and that more of the oxygen is available for aerobic metabolism of the glucose into energy which results in movement. Blood flow to fat tissue provides oxygen for these living cells. The return of blood from fat tissue to the lungs results in a decrease of oxygen that could have been supplied to the active muscles. The resulting reduction in available oxygenated blood for aerobic activity results in greater anaerobic metabolism and a reduced Max. VO2.

When viewing the HFZ® charts, the reader will note that a person with a higher BMI will have a lower estimated Max VO2. This can be interpreted to mean that the person with the higher BMI will be using more anaerobic metabolism to convert glucose into energy through chemical reactions for the given work load and intensity than a person of the same age and gender with a lower BMI. The person with the higher BMI is actually working harder because of the excess weight but the key factor is the type of metabolism that is being used to convert glucose into energy. While both people can run a given number of PACER® laps or can complete the mile at a given time, the mathematical equation indicates that the person with the lower BMI has a more efficient system that primarily uses aerobic metabolism to convert glucose into energy and hence has a higher estimated Max VO2. A person with a higher BMI will need to run or walk
the mile faster or will need to complete more PACER® laps to indicate that aerobic metabolism is the primary source of energy conversion.

Let’s apply the above information to a real life example. Two, 12 year-old children jog up three flights of stairs. One has a BMI of 32 and the other has a BMI of 23. They both arrive at the top step at exactly the same time. The one with the lower BMI is breathing a bit heavy but can carry on a conversation. The one with the higher BMI is out of breath and cannot complete a sentence. Who is in better “shape” and why?

**Become Proactive**

As physical educators, we need to apply the scientific knowledge of exercise physiology to the new HFZ® tables and need to help students, parents, and all educators make the assessment paradigm shift. The new HFZ® tables for aerobic capacity reflect the predictions of Max VO2 which indicate the function and efficiency of the cardio-respiratory system. The efficiency of this system cannot simply be predicted by the number of PACER® laps or by how fast a mile was run. Those who make the paradigm shift will be better able to recognize the health consequences associated with a higher BMI.

The Cooper Institute has indicated that it will be easier for students in grade 5 to reach the HFZ® while it will be more difficult for older boys to reach the HFZ® for aerobic capacity using the new tables. While this is true, our prediction is that administrators and teachers will find a minimal increase. Instruction, information dissemination, and appropriate preparation are the critical factors, not the new tables. Will teachers take the time to explain aerobic metabolism, aerobic capacity, and the effects of a higher BMI on the cardio-respiratory system’s function and efficiency? How will teachers present the new tables? How will the new tables be explained to parents? Did teachers provide students with adequate preparation for the 2010-2011 fitness testing? If not, will they provide for appropriate preparation in the future? Have students had multiple opportunities to try the mile run and PACER® to determine their test preference? Have students, ages 13 and older, been given the opportunity to practice walking a mile and recording their heart rate and time? We suggest that they be given the opportunity to take the mile walk test as there is some indication that the mile walk test is a better measure of aerobic capacity for those with a higher BMI.

As physical educators we need to become proactive and provide information to parents at Back to School Night, Open House, and through written communication. Consider doing a Board of Education information presentation. Meet with your physical education colleagues and administrators to design a plan of action. Use the *Understanding the New Healthy Fitness Zones®* PowerPoint Presentation provided on the CAHPERD Website at www.cahperd.org in the *Physical Education Advocacy Toolkit*. The toolkit is accessed by clicking Advocacy Resources under the Legislation and Advocacy tab. Provide your students with a link to a Max VO2 calculator; give them physical education homework and have them chart their progress on increasing their predicted Max VO2 throughout the year. As a state and nation that is focused upon the
health consequences of obesity, you are challenged to make the paradigm shift and use this teachable moment to guide our future adults to practicing a healthier lifestyle characterized by increased movement and greater aerobic capacity.