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PERSONAL TRAINING — A BROAD PROFESSION

By Julie Downing, Ph.D., FACSM
Health & Human Performance Department
Central Oregon Community College

The professional Personal Trainer performs many different jobs when working with their clients.

How do we know that the profession of Personal Training has such a broad list of job tasks? We (the ACSM Personal Training Committee) took a very simple approach and recently surveyed Personal Trainers about what their job entails and the importance/frequency of each task. This is the second time we have conducted such a survey. Our first one was conducted in 2004 when ACSM introduced its Personal Training certification. This time, we had nearly 2,100 survey respondents and what we found was not necessarily surprising but instead confirmed what we strongly suspected to be the case in the world of Personal Training — Personal Trainers do it all. They are involved in many different tasks in helping clients achieve goals and objectives.

Job Task Analysis Survey highlights illustrated that Personal Trainers:

• work with all populations (provided that they have been medically cleared for exercise) with a multitude of goals and require knowledge to modify exercise prescription/assessment based on clients needs.

• must possess knowledge of proper spotting techniques for various exercises.

• coach/counsel clients and are using several different health behavior change models, as well as motivational techniques.

• require business/marketing knowledge in order to be successful.

• must be able to communicate effectively in-person, on the phone, and electronically.

• earn clients trust by ensuring safety and helping clients achieve their goals.

So with this valuable insight from the Job Task Analysis, our ACSM certification exam preparation materials, textbooks, and exam content will more closely reflect what today’s trainer needs to know. Our certification exam blueprint will now have the following four content domains (percentages shown are the proportion of the exam questions from each area):

I – Initial Client Consultation & Assessment 26%
II – Exercise Programming & Implementation 27%
III – Exercise Leadership & Client Education 27%
IV – Legal/Professional/Business/Marketing 20%

So in summary, the ACSM Personal Training Certification exam will include more content on:

• behavior modification (found in domain III and goes beyond the six stages of change transtheoretical model), strength training, spotting techniques, business/marketing, effective communication, and finally working with special populations who have been medically cleared for exercise.

The ACSM’s Resources for the Personal Trainer, 3rd Edition text is extremely helpful in reviewing for the ACSM Personal Training Certification. For more information on ACSM’s Personal Training Certification, visit www.acsm.org/certification.

Thanks to all of you who helped us out by completing the recent Personal Trainer job task analysis survey. We could not have done this valuable work without your feedback.
It is well documented and understood that the first four to six weeks of any resistance training program involves stimulating and developing motor pathways.  

As fitness professionals, part of our job is to help facilitate the development of these motor pathways by collecting the necessary information through client assessment, evaluating this information, and prescribing exercise that reflects this information.

Properly trained fitness professionals are well prepared and eager to design exercise prescriptions based on a client's needs, goals, health history, and initial fitness assessment. There does, however, exist a need to examine the process by which fitness professionals go about collecting this information. Testing protocols often become routine practice, utilizing the same health related fitness assessments for all clients as a starting point. This use of routine testing is due to the validity and reliability of the assessments proven over time, which is to be respected as these assessments provide information that helps us when prescribing exercise. However, we need to evaluate our assessment choices and offer a variety of ways to assess our clients that would better represent the individual's needs beyond the basic components of fitness. The ability to assess a client's motor learning needs could certainly be part of this process.

In preparation of administering a fitness assessment and following a review of a client's health history and exercise experience, a fitness professional should ask themselves the following questions. What are my options for testing the basic components of fitness? Does the facility provide the space, equipment and time to offer the client these options? How do I offer those choices to my client? Is there anything else that exists outside of the basic components of fitness that I can offer a client as part of their initial assessment? Testing for a motor learning skill that is specific to the needs of the client could possibly be part of this assessment. This would be in addition to and not in place of the testing of the basic components of fitness.

**Motor Learning as a basis for fitness assessment and program development**

Most people possess a certain amount of basic motor skills. Day to day motor abilities enable an individual to navigate their way through the world. A basic skill such as brushing your teeth is so well learned through childhood that the thought behind the act of brushing is non-existent, except for the motivation to initiate the movement. Therefore, motor learning is a part of person's natural growth and internal processes that determine a person's ability to perform motor skills well and with good technique.  

Motor skills for athletic performance, however, are very different and require an assessment process that is planned and systematic.

The following are five important questions to review before beginning a motor skills assessment:

1. Why assess?
2. What variables should I assess?
3. Which test will assess the most important variable?
4. How will you prepare the client for the assessment?
5. How will you utilize the results?

For example, a male client presents with a goal of improving his tennis game. After a short conversation with this client, together you establish that he would like to improve his return game from the baseline. In addition to the basic components of fitness, you decide to conduct a baseline speed and agility forehand and backhand test. To prepare your client you would describe the test and the procedures leading up to the actual test. Provide a visual demonstration prior to testing along with specific instructions regarding the testing procedure and all beginning and ending parameters. Begin with a proper warm-up, and following a proper cool-down period, share the results of the assessment with your client. This would include relating your client's performance to any norms generated from prior testing and research, and then relate the results to future strategies for training.

There exists a plethora of tests related to motor performance. Choosing the proper test requires a little research and the ability to apply it to the needs and goals of the client. Fleishman and colleagues have developed taxonomy of motor abilities with two main categories; perceptual motor abilities and physical proficiency abilities. Some examples of Fleishman’s physical proficiency abilities include static strength, dynamic strength and explosive strength. Some examples of Fleishman’s perceptual motor abilities would include response orientation and reaction time. Using this taxonomy as a guide (see Table), a fitness professional analyzing the client's needs should be able to choose an ability that most closely relates to the client's need and conduct a test that will support that choice. It would be important to
assess those physical abilities either in a generic fashion or by recreating the goal task as part of a pre/post type assessment.

Utilizing Fleishman’s Taxonomy of Motor Abilities, the baseline speed and agility drill cited above would be an example of recreating a gross body coordination test that is task specific to the baseline play that is common during a tennis match, whereas an example of a generic test would be the timing of a client in the 40 yard dash. When deriving assessments to measure particular abilities, it is necessary to record the specifics of the assessment to maintain the reliability of the post-test.

## Conclusion

Knowing how the body works and best adapts to stimuli is vital to the client/fitness professional relationship. Understanding the acquisition of motor skills is an integral part of fitness professional’s training skill. A fitness professional who can integrate these concepts into his program assessment, exercise prescription and subsequent training will help facilitate the client’s goals more effectively.

**About the Authors**

Dierdra Bycura, Ed.D., ACSM-HFS, CPT is an assistant clinical professor at Northern Arizona University in Flagstaff, Arizona. Dierdra also is a member of the ACSM Exam Development Team for credentialing and certification.

Thomas P. Mahady, M.S., CSCS is the senior exercise physiologist for The Cardiac Prevention and Rehabilitation Center at Hackensack University Medical Center in Hackensack, NJ. He also is an adjunct professor at William Paterson University in Wayne, NJ.

**References**


### Table. Fleishman’s Taxonomy of Motor Abilities

<table>
<thead>
<tr>
<th>Abilities</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control precision</td>
<td>Highly controlled movement adjustments, especially those involving larger muscle groups</td>
<td>Dribbling a soccer ball</td>
</tr>
<tr>
<td>Multi-limb coordination</td>
<td>Coordinate numerous limb movements simultaneously</td>
<td>Volleyball spike</td>
</tr>
<tr>
<td>Response orientation</td>
<td>Select a response rapidly from a number of alternatives, as in choice reaction time situations</td>
<td>Tail back trying to find an opening</td>
</tr>
<tr>
<td>Speed of limb movement</td>
<td>Make gross rapid limb movement without regard for reaction time</td>
<td>Hockey slap shot</td>
</tr>
<tr>
<td>Rate control</td>
<td>Make continuous speed and direction adjustments with precision when tracking</td>
<td>Mountain biking</td>
</tr>
<tr>
<td>Manual dexterity</td>
<td>Control manipulations of large objects using arms and hands</td>
<td>Water polo</td>
</tr>
<tr>
<td>Finger dexterity</td>
<td>Control manipulations of small objects primarily through the use of fingers</td>
<td>Dialing a cell phone</td>
</tr>
<tr>
<td>Arm-hand steadiness</td>
<td>Make precise arm-hand positioning movements where involvement of strength and speed are minimal</td>
<td>Dentistry</td>
</tr>
<tr>
<td>Wrist finger speed</td>
<td>Move the wrist and fingers rapidly</td>
<td>Blackjack dealing</td>
</tr>
<tr>
<td>Aiming</td>
<td>Direct hand movements quickly and accurately at a small object in space</td>
<td>Marksmanship</td>
</tr>
</tbody>
</table>

**Physical Proficiency Abilities**

<table>
<thead>
<tr>
<th>Abilities</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Static strength</td>
<td>Ability to generate maximum force against weighty external object</td>
<td>Pushing car out of snow bank</td>
</tr>
<tr>
<td>Dynamic strength</td>
<td>Muscular endurance or ability to exert force repeatedly</td>
<td>Rock climbing</td>
</tr>
<tr>
<td>Explosive strength</td>
<td>Muscular power or ability to create maximum effort by combining force and velocity</td>
<td>Throwing javelin</td>
</tr>
<tr>
<td>Trunk strength</td>
<td>Dynamic strength of trunk muscles</td>
<td>Pole vault</td>
</tr>
<tr>
<td>Extent flexibility</td>
<td>Ability to move trunk and back muscles through large range of motion</td>
<td>Circus contortionist</td>
</tr>
<tr>
<td>Dynamic flexibility</td>
<td>Ability to make repeated, rapid flexing movements</td>
<td>Diving, aerial ski jumping</td>
</tr>
<tr>
<td>Gross body coordination</td>
<td>Ability to coordinate numerous movements simultaneously while the body is in motion</td>
<td>Slalom skiing, synchronized swimming</td>
</tr>
<tr>
<td>Gross body equilibrium</td>
<td>Ability to maintain balance without visual cues</td>
<td>Tightrope walking while blindfolded</td>
</tr>
<tr>
<td>Stamina</td>
<td>Cardiovascular endurance or ability to sustain effort</td>
<td>Climbing Everest</td>
</tr>
</tbody>
</table>

Information obtained from 1, 4.
The term "functional training" has become a popular buzzword in the fitness field — so much so that several leading fitness organizations now call it one of the biggest current industry trends. The question is, does the concept live up to the hype?

"Functional fitness" has been defined as having the physical capacity to perform activities of daily living in a safe and independent manner without undue fatigue. Some fitness professionals refer to this as "strength you can use." One of the most popular techniques touted to improve functional fitness is the use of unstable surface training. Training implements employed to induce instability include wobble boards, foam rollers, stability balls, balance discs, and BOSU devices, among others.

According to proponents, training on an unstable surface imposes a greater challenge to the neuromuscular system, thereby eliciting maximal improvements in human function. Indeed it has been shown that unstable surfaces are valuable in rehabilitation settings, particularly in helping to alleviate symptoms associated with lateral ankle sprains. There also is a substantial body of research showing that performing abdominal and lumbar exercises on unstable implements increases activity of the core musculature compared to similar movements performed on a stable surface. And there is some evidence that training in an unstable environment may help to improve proprioception in the lower body musculature, potentially by enhancing sensory perception. Whether these enhancements translate into better performance of activities of daily living, however, is open for debate.

A problem with the practical application of unstable surface training is that it often fails to take into account the concept of specificity. The "Specific Adaptation to Imposed Demand" (SAID) principle dictates that optimal transfer of the exercise benefit is achieved when movements most closely match those of a given task. Considering that the vast majority of everyday activities are carried out in a stable environment, it therefore follows that functional transfer will be optimized by training on stable surfaces. This is consistent with research by Yaggie and Campbell, who found that although training on a BOSU® ball improved subjects' ability to stand quietly, it failed to improve functional markers of strength, balance, and power.

Moreover, it is important to note that people commonly lose functional ability due to a loss of muscle tissue and thus an associated loss of body strength by 175% and their functional scores on a test of walking and balance improved by approximately 48%. Two of the participants were actually able to walk without the assistance of their canes! These improvements in function were attained by training solely on a resistance machine — an implement that functional training proponents often dismiss as developing “non-functional” strength.

Alternatively, unstable surface training has been found to be suboptimal for increasing strength. Behm, et al. studied the EMG response to exercise when training on both stable and unstable surfaces. Eight physically active males performed maximal voluntary contractions of the knee extensors and plantar flexors while either seated in a chair (stable surface) or on a Swiss ball (unstable surface). Results showed that training on the unstable surface resulted in a 44% reduction in muscle activity and a 70% decrease in force output compared to the same activities performed on the stable surface. Similar findings have been reported in many other studies, with results holding true in the performance of both upper body and lower body exercises. A decrease in muscle force output during training mitigates increases in muscular strength, which would seemingly attenuate functional transfer.

Further, the functional benefits of unstable surface training also may be limited in athletic populations. Cressey et al. investigated the use of unstable surface training on athletic performance in elite athletes. Nineteen recruits (ages 18 to 23 years) from a National Collegiate Athletic Association Division I college soccer team were randomly divided into one of two groups, where ten subjects supplemented their usual exercise program by performing various lower body exercises on inflatable rubber discs while the nine others performed the same exercises on a stable surface. Performance was assessed by a variety of tests including the bounce drop jump, countermovement jump, 40- and 10-yard sprint times, and T-test. After 10 weeks, the stable surface group displayed greater performance improvements in all measures studied compared to the unstable surface group, leading the authors to conclude that use of unstable surfaces may not be optimal for athletic performance improvements in healthy, trained individuals. It was surmised that diminished results in the unstable surface group may be due to a reprogramming of neuromuscular patterns that chronically impairs stretch-shortening cycle function essential for the performance of sport activities.

In conclusion, commonly accepted training tenets need to be reexamined with respect to the concept of functional fitness. Central to the design of any fitness program is the principle of specificity, where exercise routines are matched to an individual’s needs, abilities, and goals. Based on available research, it would seem that functional improvements are best achieved when a majority of training is carried out on stable surfaces. In certain circumstances, it is possible that the addition of unstable surface exercises to a routine may provide a synergistic benefit to func-
Femoral internal rotation. As an alternative to internally rotating the femur, the piriformis muscle is an external rotator and weak abductor of the femur at the hip joint and internal hip rotation is an important component of a piriformis stretch. Several figures in the article show the hip being placed in external rotation.

Editor’s Note regarding the Wellness Article, “Piriformis Syndrome: A Real Pain in the Butt” in the April–June 2010 issue of ACSM’s Certified News

Several figures in the article show the hip being placed in external rotation. The piriformis muscle is an external rotator and weak abductor of the femur at the hip joint and internal hip rotation is an important component of a piriformis stretch. Shortening of the piriformis muscle may limit internal rotation. They might experience discomfort during and/or a difficulty achieving much femoral internal rotation. As an alternative to internally rotating the femur, the benefits of femoral internal rotation can be achieved by rotating the trunk ipsilaterally (to the same side) and by flexing the trunk slightly (in a supported manner). Piriformis stretches are often performed in conjunction with stretches for the gluteus maximus, hamstrings, and iliotibial band because of their collective effects on hip joint motion and stability. A supine piriformis stretch for the gluteus maximus, hamstrings, and iliotibial band because of ipsilaterally (to the same side) and by flexing the trunk slightly (in a supported manner) to initiate femoral internal rotation.

**About the Author**

Brad Schoenfeld, MS, CSCS, is the president of Global Fitness Services in Scarsdale, NY. He is an adjunct professor at Lehman College in the Department of Health Sciences, and serves as an associate editor for the NSCA’s Strength and Conditioning Journal.

**References**

NEW THOUGHTS ON WHAT REALLY CAUSES HEART DISEASE AND HOW EXERCISE HELPS BEYOND TRADITIONAL RISK FACTORS

BY JANET P. WALLACE, Ph.D., FACSM AND BLAIR JOHNSON, M.S.

The endothelium, the single most inner layer of the artery, is the site of origin for atherosclerosis development. The endothelial production of nitric oxide (NO) is how the endothelium protects the artery from atherosclerosis. Nitric oxide controls the antiatherogenic activities of platelet aggregation, coagulation, adhesion, fibrinolysis, and vascular tone in the artery. The left panel of Figure 1 illustrates NO synthesis and function. The synthesis of NO from L-arginine, oxygen, and electrons carried by nicotinamide adenine dinucleotide phosphate (NADPH) is catalyzed by endothelial nitric oxide synthase (eNOS), and dependent on other cofactors. Endothelial nitric oxide synthase can be activated by shear stress from arterial blood flow, insulin, and acetylcholine (ACh). Insulin’s stimulation of eNOS and subsequent NO production is dependent on insulin sensitivity, which could be a mechanism of why patients with diabetes are at higher risk for cardiovascular diseases.10

The right panel of Figure 1 illustrates how the NO role in protecting the endothelium is compromised in oxidative stress. Superoxide radicals ($O_2^-$) can accumulate as a result of excess oxidative stress. Nitric oxide is used up as an antioxidant scavenger of $O_2^-$. The reaction between $O_2^-$ and NO not only contributes to loss of NO available for the antiatherogenic functions of the endothelium, but it also results in formation of peroxynitrite (ONOO$^-$), itself a potent oxidant. Furthermore, $O_2^-$ and ONOO$^-$ oxidize a cofactor necessary for normal production of NO by eNOS, which leads to loss of eNOS functioning. This dysfunctional eNOS produces $O_2^-$ instead of NO, thus resulting in a vicious cycle of more oxidative stress. Taken together, oxidative stress results in what we call reduced NO bioavailability which compromises all the protective functions of the endothelium.

Among the sources of oxidative stress for any individual is a high-fat meal. A high-sugar meal also is a direct source of oxidative stress for patients with diabetes. Atherosclerotic cardiovascular disease was proposed to be a meal-related (postprandial) phenomenon as early as 1979 and has grown in acceptance, more so in other countries. In fact, postprandial lipemia (fat in the blood) is now been considered an independent risk factor for atherosclerotic cardiovascular disease.10 The average diet of a healthy North American man consists of approximately 50 to 100 g of fat per day, consumed during three to six eating events. Depending on the size and composition of the meal, the postprandial lipemic response can last up to eight hours, and therefore the typical North American diet results in continuous exposure to postprandial lipemia. As illustrated in Figure 2, each exposure increases the lipemia. When cells utilize the fats oxidative stress results, leading to endothelial dysfunction. The NO mediated protective mechanisms for the endothelium are compromised as illustrated in Figure 1 (right panel) causing endothelial dysfunction. Sedentary and overweight adults tend to have higher fat intake, exacerbating this atherosclerotic oxidative cycle by prolonging and magnifying the adverse absorptive state. Consecutive high-fat meals produce greater endothelial dysfunction and higher oxidative stress for each consecutive meal. Thus, recurring postprandial oxidative stress initiates a nearly continuous cycle of endothelial dysfunction.

The classic study by Vogel and colleagues reported a decline in endothelial function following a high-fat meal in 10 healthy adults in 1997. Figure 3 illustrates the endothelial response to high-fat and low-fat meals. The low fat...
meal had no effect on the endothelium (blue line), whereas the high-fat meal exhibited a decline in function throughout the postprandial period (red line). The lowest point in endothelial function is at four hours following the meal, returning to baseline at six hours. The decline in endothelial function was in response to the increase in triglycerides (lipids). Later research found the increase in triglycerides increased oxidative stress. Thus, the lipemic load produced the oxidative stress which resulted in endothelial dysfunction.

In a recent review article, we found that approximately 45% of calories from fat is the minimum amount of fat that causes endothelial dysfunction; which also is contingent on the type of fat consumed. Most saturated fats, including monounsaturated fats, are capable of impairing endothelial function. Transfats and foods cooked in re-used deep-frying oil generate even further damage to the endothelium. However, polyunsaturated fats have been found not impair endothelial function.

**How can we prevent the consequences of a high-fat meal?**

Interventions targeting a lower lipemic load or oxidative stress have been designed to counteract the consequences of a high-fat meal. Lipemic load has been managed through the use of insulin and exercise, whereas oxidative stress has been manipulated with statins, exercise, and diet, including antioxidant vitamins, or supplementation.

In exercise interventions, the exercise stimulus has been either one single exercise session or the effects of training/detraining. We repeated the classic study by Vogel and colleagues, but added a 40 minute session of treadmill walking two hours after the high-fat meal. As illustrated in Figure 4, we found that the exercise not only counteracted the decline in endothelial function, but improved it. Then we observed how active and inactive adults responded to the high-fat meal and found the active adults had no decrease in endothelial function at four hours after the meal, whereas the inactive adults decreased 31%. See Figure 5. We also found the active adults to have a lower triglyceride response, lower oxidative stress response, and higher antioxidant response to the high-fat meal.

Exercise has several ways of affecting endothelial function. Exercise can act through an improvement in insulin sensitivity, decrease in postprandial lipemia, increase in NO, and/or an increase in antioxidant defense. A single session of most types of exercise, including resistance exercise is sufficient to increase insulin sensitivity, in healthy, obese, and type 2 diabetic adults. Similarly, exercise training improves insulin sensitivity regardless of age, in healthy, obese, and type 2 diabetic adults; even with no change in VO2max. Changes in insulin sensitivity associated with exercise vanish within three to five days; and can be regained after a single exercise session.

Dynamic exercise (acute or chronic) causes a significant, moderately large decrease in postprandial lipemia. There appears to be no influence of exercise intensity, duration, or time between exercise and the meal on the attenuation of postprandial lipemia. The sequence of the exercise, before or after the meal, does not affect the decrease in postprandial lipemia. Even the accumulation of intermittent physical activity throughout a single day is as effective in
WHO'S IN THE DRIVER'S SEAT?

By Margaret Moore (Coach Meg), MBA

IN HEALTH CARE, EXPERTS ARE TYPICALLY IN THE DRIVER'S SEAT WHEN IT COMES TO PATIENT CARE. AS WELLNESS COACHES, WE ARE KEENLY AWARE THAT THIS APPROACH IS NOT EFFECTIVE IN FOSTERING LONG-LASTING BEHAVIORAL CHANGE. FOR CLIENTS TO THRIVE AND ACHIEVE OPTIMAL HEALTH AND WELL-BEING, THEY MUST GET INTO THE DRIVER'S SEAT, BOTH IN COACHING SESSIONS AND, ULTIMATELY, IN LIFE.

WHY TAKE THE WHEEL?

According to proponents of the self-determination theory, navigating from behind the wheel is the most natural place for humans. We are self-determining beings, innately inclined towards psychological growth and development. We are happiest and most productive when we are in control of our lives. Richard M. Ryan, Ph.D., and Edward L. Deci, Ph.D., (2000) at the University of Rochester write, "The fullest representations of humanity show people to be curious, vital, and self-motivated. At their best, they are agentic and inspired, striving to learn; extend themselves; master new skills; and apply their talents responsibly. That most people show considerable effort, and extend themselves; master new skills; and apply their talents responsibly. That most people show considerable effort, agency, and commitment in their lives appears, in fact, to be more normative than exceptional, suggesting some very positive and persistent features of human nature" (p. 68).1

PLEASE DRIVE ME

Yet many of our clients surrender the wheel to others, causing them to become stuck, unable to move toward their desired destination. They take what appears be an attractive but unproductive detour, seeing it as the "easy way out," avoiding responsibility for the direction of their own lives. Some choose to ride in the passenger seat, while, even worse, some sit in the back seat. Veering off course, they are no longer true to their own internal compass, and soon feel lost and discouraged.

It is not difficult for coaches to differentiate between the drivers and the passengers. We have all seen clients who readily comply, doing what others say is good for them, such as taking their medications or eating broccoli. Others defy by resisting a request or advice. Either way, these clients are not acting autonomously. A coach will often hear: "My doctor is in charge, my genes are in charge, the experts and their prescriptions are in charge, my wife makes the health decisions, my job is in charge." When other people or external forces are in the driver's seat, failure is ultimately likely, especially for those who are trying to lose weight, get fit, or adopt any new habit. The best way for our clients to achieve their goals is to help them take their rightful place behind the wheel. We must encourage them to tap into self-motivation, which according to Deci and Ryan, "is at the heart of creativity, responsibility, healthy behavior, and lasting change" (p. 9).1

OUR CORE DRIVES

Deci and Ryan’s theory of human motivation asserts that human thriving results from satisfying three motivational drives: the desire to be autonomous (making choices that are true to one’s core, not imposed by others or one’s inner critic); to be competent (using one’s strengths, becoming skilled in life tasks); and to be connected (doing things that support others). These core drives are alive in our clients when it comes to taking good care of their mental and physical health. As coaches, it is our job to help our clients recognize, enliven, and strengthen them.

COAXING CLIENTS INTO THE DRIVER’S SEAT

We can learn valuable lessons from the work of Deci and Ryan. First, it is important to acknowledge that, even as coaches, we are not able to motivate our clients. We can only create the conditions in which they will motivate themselves. Fostering choice will increase our clients’ intrinsic motivation.

Taking our clients’ perspective not our own, we must encourage our clients to initiate, experiment, and assume responsibility. We must be willing to set limits while still supporting our clients’ autonomy — helping them discern where their rights end and the rights of others begin, while making sure the limits are as wide as possible and allow for choice. In addition, we must help them recruit sources of autonomy support outside the session. We also must be attuned to facilitating feelings of competence, which are crucial for intrinsic motivation.

LOOK, I’M DRIVING!

According to Deci and Ryan, humans have an innate need to feel competent. Yet, we may be driven by a negative belief we have constructed about ourselves and be swayed by our inner critic: “I am a loser or a failure or inadequate because I cannot lose weight, stay on a fitness routine, meditate longer than a few nanoseconds, or avoid doughnuts when they are put on a plate in front of me.” To combat feelings of inadequacy, our clients must be encouraged to be proactive, taking on optimally challenging tasks with our enthusiastic support. Cheering on our clients to success, we enable them to feel competent, energized, and motivated. According to Deci and Ryan, feelings of competence are crucial and, when accompanied by autonomy, lead to increasing accomplishment and learning throughout life.

CONCLUSION

If our clients are to achieve optimal health and well being, they must take charge of the wheel, figuring out what works for them as unique individuals so that it becomes part of who they are and non-negotiable. Coaches should encourage clients to act as though they are in the driver’s seat — to be the boss who solicits advice from the experts, then experiments, reflects, adjusts, and experiments again to arrive ultimately at the best result.
Both the 2006 and 2010 American College of Sports Medicine's Guidelines for Exercise Testing and Prescription recommend a standard strength training protocol that involves eight to 12 repetitions with an appropriate resistance. Of course, there is an inverse relationship between the exercise resistance and the number of repetitions that can be completed. Although there is considerable variability among individuals and muscle groups, 8 to 12 repetitions can typically be completed with approximately 75% of maximum resistance.

While 8 to 12 exercise repetitions is a generally accepted guideline for beginning trainees, most fitness professionals have heard that muscle strength is best developed by training with lower repetitions (e.g., 4 to 8 reps per set), muscle hypertrophy is best developed by training with moderate repetitions (e.g., 8 to 12 reps per set), and muscle endurance is best developed by training with higher repetitions (e.g., 12 to 16 reps per set)). However, the 2006 ACSM guidelines for resistance exercise prescription state that “Thus, for any common range of repetitions (3 to 6, 6 to 10, 10 to 12, etc.) there is little evidence to suggest a specific number of repetitions will provide a superior response relative to muscular strength, hypertrophy, or absolute muscular endurance” (page 156). These guidelines recommend that strength training participants “…choose a range of repetitions between 3 and 20 (e.g., 3 to 5, 8 to 10, 12 to 15) that can be performed at a moderate repetition duration…” (page 158).

One study that compared low-repetition and moderate-repetition training was conducted by Chestnut and Docherty with previously untrained young men (mean age 24 years). The low repetition group performed 6 sets of 4 repetitions each, and the moderate repetition group performed 3 sets of 10 repetitions each. This volume-equated training protocol was practiced three days a week for a period of ten weeks. At the conclusion of the training program, both the low-repetition exercisers and the moderate-repetition exercisers experienced similar increases in muscle strength and muscle cross-sectional area, indicating similar effects on muscle strength and muscle hypertrophy from both exercise protocols in previously untrained young men.

A study by Bemben and others examined the effects of moderate-repetition and high-repetition exercises on muscle strength and size in previously sedentary women between 41 and 60 years of age. The moderate-repetition trainees performed 8 repetitions per set and the high-repetition trainees performed 16 repetitions per set. Both exercise groups trained three days a week for a period of six months. At the conclusion of the training program, both the moderate-repetition exercisers and the high-repetition exercisers attained similar improvements in muscle strength and muscle cross sectional area, suggesting similar effects on muscle strength and muscle hypertrophy from both exercise protocols in previously untrained middle-aged women.

Behm and colleagues incorporated a different approach to examine the muscle activation response to low, medium, and high-repetition resistance training. Using electromyograph (EMG) technology, these researchers monitored 14 trained young men (mean age 21 years) as they performed five repetitions with their five-repetition maximum resistance, 10 repetitions with their 10-repetition maximum resistance, and 20 repetitions with their 20-repetition maximum resistance. The results revealed no significant differences in muscle inactivation, strength loss, or antagonist/agonist EMG activity whether training to muscle fatigue with 5, 10, or 20 repetitions. These findings indicated that trained young men experience similar muscle responses to low, medium, and high-repetition strength exercise that terminates in tissue fatigue.

A 2009 study by Wilborn and others investigated the effects of moderate-repetition and high-repetition training on several key regulators of muscle development and hypertrophy. The objectives were to 1) compare the hypertrophic and myogenic responses to moderate and high-repetition training and 2) determine whether training-induced muscle development and hypertrophy occurred with a single resistance training protocol. The subjects were 13 previously untrained young men (mean age 21.5 years) who performed two strength training sessions separated by two weeks, serving as their own controls in a cross-over research design. During one session the participants performed four sets of 18 to 20 repetitions with 60% to 65% of their maximum resistance, and during the other session they performed four sets of eight to 10 repetitions with 80 to 85% of their maximum resistance. After each exercise session, muscle biopsies were obtained (at four time periods) to assess changes in gene expression and myogenic activity. Both exercise protocols produced the same effects with respect to the expression of various genes that are involved in muscle hypertrophy. The researchers concluded that strength exercise between 60% to 85% of maximum resistance (8 to 20 repetitions) is effective for eliciting significant changes in the hypertrophic and myogenic regulators associated with training-induced muscle development.

Based on the result of these repetition studies, it would seem that training to muscle fatigue with sets of 4 to 20 repetitions is effective for increasing muscle strength and hypertrophy, with no significant differences among low, moderate and high-repetition exercise protocols. These findings seem to support the 2006 ACSM resistance training statement that a range of 3 to 20 repetitions per set may be effective for enhancing muscle strength and size.

The number of repetitions performed with a given percentage of maximum resistance may differ due to muscle fiber composition (ratio of Type 1 and Type 2 muscle fibers), which varies among individuals and muscle groups, and changes with age. However, it would
appear that for most people, improvements in muscle strength, size, and endurance may be attained with a range of repetitions, as long as the exercise set is continued to muscle fatigue. That is, the key to muscle development seems to be high-effort resistance exercise that fatigues the target muscles within the anaerobic energy system. From a practical perspective, the application of this information may render strength training a more interesting activity through greater variation of exercise protocols and progressions.

About the Author
Wayne L. Westcott, Ph.D., teaches exercise science and conducts fitness research at Quincy College in Quincy, MA.

References

Summary
The postprandial period creates a harmful environment in the endothelium leading to atherosclerotic cardiovascular disease, including heart attack, stroke and claudication. We have always known exercise to have a role in the prevention and treatment of these diseases, but the role of exercise may not be simply reducing risk factors like high cholesterol or high blood pressure. Exercise may act best through reducing postprandial lipid load, improving insulin sensitivity, increasing antioxidant defense and/or increasing nitric oxide. Perhaps we should broaden our perspective in our approach to prevent or treat atherosclerotic cardiovascular disease through the classic risk factors.

About the Authors
Janet P. Wallace, Ph.D., FACSM, has been involved in ACSM certification since 1975 when she participated in the first ACSM Exercise Specialist Workshop and earned ES certification #1. She served on the CCRB from 1991-1994 and 2000-2009. She also served on the ACSM Board of Trustees from 1994-1997 and the Committee on the Accreditation of the Exercise Sciences from 2003-2006. After creating and operating one of the most recognized clinical programs at Indiana University (1986-2005), she is now leading an endothelial function research group. Please visit her research at: http://www.iue.edu/~afp/research.html.

Blair Johnson, M.S., is currently pursuing a doctorate in exercise physiology at Indiana University. His focus is on postprandial endothelial function and how various blood flow patterns affect endothelial function. In 2007, he received his Master of Science degree from the University of Wisconsin-La Crosse in Human Performance after working as a research associate for the Cooper Institute. He has been an ACSM member since 2001.

References
Clinical Column

A PERSPECTIVE ON LOWER EXTREMITY PERIPHERAL ARTERIAL DISEASE AND EXERCISE

The most recent American Heart Association fact sheet on lower extremity peripheral arterial disease (PAD) reports that about 8 million Americans are afflicted. About 10% to 15% of these individuals become symptomatic (i.e., intermittent claudication) when they walk.

BY JONATHAN K. EHRMAN, Ph.D., FACSM, CES

Individuals with PAD are typically over age 50, many have diabetes, many are current or former smokers, and the disease can have profound affects on the ability to ambulate. The prevalence of PAD, as with most chronic diseases, is anticipated to increase over the next two decades in conjunction with the aging of the population. PAD often goes undetected because many patients do not recognize symptoms. This emphasizes the need for appropriate clinical and community based screening for PAD. Unfortunately in both diagnosed and undiagnosed patients, and in those who are not treated appropriately, PAD can profoundly affect quality of life. And importantly, those with PAD are at an increased risk for developing cardiovascular disease, chronic angina, and have a reduced life expectancy. These persons also typically self-impose an increasingly sedentary lifestyle as a method to remain asymptomatic. This in turn increases health risks associated with inactivity.

Standard treatments for symptomatic PAD include medication (Pletal and antiplatelets), revascularization (percutaneous angioplasty or bypass), and exercise training. Although each of these treatments is shown to be effective, it is unknown in which patients any one of these treatments is most effective. Also it is unknown if there is synergism among these treatments. An important study titled Claudication: Exercise Vs. Endoluminal Revascularization (CLEVER), sponsored by the National Heart, Lung and Blood Institute of the National Institutes of Health, is currently addressing the treatment issue. This study is designed to assess the effect of the three aforementioned standard PAD treatments on maximal walking duration. The premise of this study is that there is equipoise between these treatment modalities, meaning that although there is improvement with each of the modalities, it is not clear which treatment is best in a given patient. The CLEVER study is attempting to determine which of these treatments is best for patients with PAD located in the aorto-iliac region, with respect to their efficacy (measured by walking time and quality of life questionnaires), safety, and cost-effectiveness. This is an excellent example of comparative-effectiveness research. Currently there are more than 100 patients randomized and study enrollment closure is anticipated some time in 2011, with results to be reported in 2013.

The CLEVER study has the potential to impact the use of supervised exercise training as a treatment therapy for these patients. Several years ago a Current Procedural Terminology (CPT) code was established for PAD rehabilitation. The code (93668) was developed in response to a preponderance of efficacy data in favor of supervised exercise training. Specifically the code refers to exercise training being performed in a rehabilitation setting. However, to date this CPT code is not reimbursed by Medicare. This is despite excellent data on the cost-effectiveness of supervised exercise versus percutaneous transluminal angioplasty (PTA) with respect to the cost of treatment relative to the gain in meters walked at six months post intervention. Importantly, the CPT code is specific to supervised exercise. In fact, supervised exercise totaling 30 to 45 minutes performed at least 3 times per week for 12 weeks has a Class IA rating for lower extremity PAD rehabilitation in the most recent ACC/AHA Guidelines on the treatment of PAD. A Class IA rating means that supervised exercise training is shown consistently in randomized, controlled studies to be effective as a means of improving PAD symptoms during exercise and allowing individuals to walk further without pain. A meta-analysis of 21 studies showed that supervised exercise improves pain free walking distance by 180% and total walking distance by 120%. Unfortunately, there is little evidence to support the common physician recommendation of “go home and walk” and no evidence that this approach is superior to supervised exercise training. It is possible a primary hindrance of home exercise for improvement in patients with symptomatic PAD is associated with the necessity to endure pain while walking. The typical PAD exercise training protocol calls for ambulation to modest or mod-
glycemic control in patients with PAD. At this time supervised exercise training can improve blood pressure control, the lipid profile, and ischemia and amputation risk. Theoretical data exists that daily exercise in those with concomitant diabetes, will exercise training reduce the risk of future chronic limb complications and the social atmosphere of a supervised exercise setting also may play an important role.

Currently it is unknown if exercise training in patients with symptomatic PAD will improve associated chronic disease risk profiles or reduce the risk of mortality. For instance, in those with concomitant diabetes, exercise training reduce the risk of future chronic limb ischemia and amputation! Theoretical data exists that daily exercise training can improve blood pressure control, the lipid profile, and glycemic control in patients with PAD. At this time supervised exercise training should be a goal of every patient with symptomatic PAD to alleviate symptoms and improve quality of life. In fact, regular walking should be a goal for all individuals. The Phase III cardiac rehabilitation setting is optimal for PAD exercise rehabilitation as these programs are typically low-cost and provide a level of supervision. In those enrolled in PAD rehabilitation it is important to apply the PAD rehabilitation CPT code in the billing process. This will allow important information to be accrued for use in future determinations of potential reimbursement for PAD rehabilitation.

### Coaching News continued from page 9

choice for them. For example, “I want to walk three days a week because I can fit it in (the five days recommended by my trainer is too much). I am more relaxed and that helps me be more present and productive at work and home. I do not want to miss out on the benefits of my walks and I have backup strategies in place.”

Seizing the wheel leads to authenticity and increased self-motivation. It fosters competence. It helps our clients build and sustain the energy and strength to handle whatever life throws their way—leading to a life of thriving and well-being.

### About the Author

Margaret Moore/Coach Meg, MBA, is the founder and CEO of Wellcoaches Corporation, a strategic partner of ACSM, widely recognized as setting a gold standard for professional coaches in health care. She is co-director, Institute of Coaching, at McLean Hospital/ Harvard Medical School. She co-authored the ACSM-endorsed Lippincott, Williams & Wilkins Coaching Psychology Manual, the first coaching textbook in health care. [www.wellcoaches.com • www.institutecoaching.org • www.coachmeg.com • coachmeg@wellcoaches.com]

### References


### Figure. Claudication Scale

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<th>Rating</th>
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<tr>
<td>1</td>
<td>Definite discomfort or pain, but only at initial or modest levels (established, but minimal)</td>
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<td>2</td>
<td>Moderate discomfort or pain from which the patient’s attention can be diverted (e.g., by conversation)</td>
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<tr>
<td>3</td>
<td>Intense pain (short of grade 4) from which the patient’s attention cannot be diverted</td>
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<td>4</td>
<td>Excruciating and unbearable pain</td>
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### About the Author

Jonathan K. Ehrman, Ph.D., FACSM, CES, is the associate program director of Preventive Cardiology at Henry Ford Hospital, Detroit MI. He also is the director of the hospital’s Clinical Weight Management Program. He has served on ACSM’s Committee of Certification and Registry Board since 2000, was chair of the Clinical Exercise Specialist Committee and is certified both as an ACSM Clinical Exercise Specialist and a Program Director. He is also the senior editor of the 6th edition of ACSM’s Resource Manual for Guidelines for Exercise Testing and Prescription and is the Umbrella Editor for the next editions [2013 release date] of the ACSM certification texts.

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THE EVOLUTION OF WORKSITE WELLNESS
ENHANCING QUALITY OF LIFE FROM 9 TO 5 AND BEYOND

BY Nikki Carosone M.S., ACSM CPT

With health care costs on the rise, and employee wellness at the forefront of most benefits discussions, more and more companies are seeking out workplace Wellness Specialists to provide employee education and increase presenteeism, while helping companies improve their bottom line. In 2007, the International Health, Racquet & Sportclub Association (IHRSA) introduced the Workforce Health Improvement Program (WHIP) Act, in an effort to make employee wellness and exercise programs tax-free and more widely recognized as a needed benefit. For more information on the WHIP Act, log onto IHRSA's homepage at www.ihrsa.org.

According to the U.S. Centers for Disease Control and Prevention (CDC), people who participate in moderate-intensity or vigorous-intensity physical activity on a regular basis lower their risk of coronary artery disease, stroke, non-insulin dependent (type 2) diabetes, high blood pressure, and colon cancer. Yet, according to a 2009 CDC research study on physical activity, more than 50% of American adults do not get enough physical activity to provide health benefits.

A recent study on presenteeism notes that the top 12 health conditions that unfavorably impact work productivity were allergies, arthritis, asthma, cancer, depression, diabetes, heart problems, hypertension, headaches, respiratory disorders, skin conditions, and back/neck/spinal injuries.

Many organizations continue to be concerned with the number of employees who are affected with these conditions and how that impacts not only days/time spent out of work, but how it translates in to overall productivity. The data published below, adapted from research collected by the International Journal of Workplace Health Management, address health risks as well as healthy behaviors, further illustrating the relationship between healthy lifestyle habits and productivity (see Figure).

Wellness Specialists are health professionals with diverse backgrounds; such as Registered Dieticians, Certified Personal Trainers, Clinical Exercise Specialists, and Certified Well Coaches. As dedicated certified health and fitness professionals, it has always been our mission to teach, coach, and educate our clients on the benefits of regular physical activity, proper diet, and healthy habits. We have the power to address and help modify or correct many if not all of the above mentioned factors that are affecting individuals in the workplace. Why then, as of late, are companies suddenly labeling “wellness” a hot-button issue? Recent studies conducted by the National Safety Council have shown that at least 25% of the health care costs incurred by working adults can be attributed to modifiable health risks, such as increased stress, inadequate physical activity levels and poor nutritional habits (www.nsc.org).

According to the National Institute for Occupational Safety and Health (www.cdc.gov/niosh) stress-related disorders are fast becoming the most prevalent reason for worker disability, costing between $20 billion and $30 billion annually due to worker absenteeism. A recent meta-analysis conducted out of Harvard suggests that medical costs can decrease by about $3.27 for every dollar spent on worksite wellness and disease prevention, and that absenteeism costs can be decreased by about $2.73 for every dollar spent. These return on investment findings suggest that the implementation of employee wellness programs could prove beneficial for budgets as well as overall health outcomes. By becoming more familiar with the ever-growing list of career opportunities that are emerging in corporate wellness, we as health and fitness professionals are able to expand our talents in areas that compliment our expertise. These opportunities arising in our industry are exciting for both the newly certified and experienced professional. Certified Health, Fitness, and Nutrition Specialists are being called upon to design motivating initiatives such as smoking cessation programs, walking programs, heart healthy aerobic classes, ergonomics awareness programs, and mind/body relaxation classes such as stretching and Yoga. In addition, city agencies such as police and fire departments, government offices, public schools, and universities also are hiring health and fitness professionals to facilitate wellness and educational programs. In 2006, 19% of companies with 500 or more employees reported offering employee wellness programs, with that number increasing to 77% of larger companies who offered some form of worksite wellness related initiative in 2008. According to a recent article in the New York Times, titled “Carrots, Sticks and Lower Premiums” by Steve Lohr; the business of worksite wellness programs is starting to boom, and some companies are offering incentives to their employees based on their involvement. In fact, a fledgling “pay for prevention” industry is beginning to emerge, offering employers ways to reward workers with...
July–September 2010 Continuing Education Self-Tests

Credits provided by the American College of Sports Medicine • CEC Offering Expires September 30, 2011

SELF-TEST #1 (1 CEC): The following questions are from “Fitness Assessment and Exercise Prescription: Are Your Assessments Providing the Information You Need?” published on page 3.

1. Which two points regarding the role of fitness assessments were discussed?
   a. Following club protocols and motor learning
   b. Individualizing assessments and motor learning
   c. Following industry standards and individualizing assessments
   d. Motor learning and physical conditioning assessments

2. The primary adaptation during the first 4 to 6 weeks of a muscular training program is the development of ________.
   a. motor sufficiency
   b. motor pathways
   c. muscle hypertrophy
   d. muscle hyperplasia

3. Which of the following are components of Fleishman’s physical proficiency abilities?
   a. Reaction time, extent flexibility, and explosive strength
   b. Trunk strength, multilimb coordination, and dynamic flexibility
   c. Gross body coordination, stamina, and reaction time
   d. Explosive strength, extent flexibility, and gross body coordination

4. Which of the following are components of Fleishman’s perceptual motor abilities?
   a. Reaction time, multilimb coordination, and rate control
   b. Multilimb coordination, trunk strength, and dynamic flexibility
   c. Gross body coordination, reaction time, and control precision
   d. Static strength, dynamic strength, and rate control

5. Fitness professionals would benefit from some fine-tuning of their fitness assessments with respect to alignment with the client’s ________.
   a. goals, health history, and current desire to exercise
   b. current desire to exercise and willingness to participate
   c. goals, health history, and prior physical activity experience
   d. prior physical activity experience and current desire to exercise

SELF-TEST #2 (1 CEC): The following questions are taken from “Is Functional Training Really Functional?” published on page 5.

1) A study by Fiatarone et al. found that nursing home patients improved their functional scores on a test of walking and balance improved by approximately ________ after performing 3 sets of 8 repetitions on a machine leg extension apparatus for 8 weeks.
   a) 10%  b) 26%  c) 39%  d) 48%

2) A study by Cressey et al. attributed a decrease in performance improvements in elite soccer players who performed exercises on an unstable surface to:
   a) a reprogramming of neuromuscular patterns that chronically impairs stretch-shortening cycle function.
   b) a reduction in muscle hypertrophy.
   c) an inhibition of calcium release from the sarcoplasmic reticulum.
   d) an increase in soft tissue injuries to the knee joint.

3) According to a study by Behm et al., a limitation of unstable surface training is that:
   a) it reduces core activation.
   b) it reduces force output in muscles of the extremities.
   c) it increases the potential for injury.
   d) it does not allow for optimal range of motion about a joint.

4) The “Specific Adaptation to Imposed Demands” (SAID) principle dictates that:
   a) multi-joint movements should be performed before single joint movements.
   b) optimal transfer of the exercise benefit is achieved when movements most closely match those of a given task.
   c) muscles must be constantly challenged beyond their present capacity.
   d) program variables should be varied over time to prevent plateaus.

5) According to McKeon et al., incorporating approximately ________ unstable surface exercises into a routine may be ideal for optimizing static and dynamic balance.
   a) 25%  b) 35%  c) 50%  d) 75%

SELF-TEST #3 (1 CEC): The following questions are taken from “New Thoughts on what Really Causes Heart Disease and How Exercise Helps Beyond Traditional Risk Factors” published on page 7.

1. Postprandial is that period of time following a meal. True  False

2. Endothelial function includes those activities that protect the artery from developing atherosclerosis. True  False

3. The substance produced in the endothelial cells that prevents arteries from developing atherosclerosis is ________.
   a) eNOS
   b) NO
   c) L-Arginine
   d) ONOO⁻

4. A high-fat meal harms the endothelium by:
   a) Increasing oxidative stress from elevated fats.
   b) Increasing NO.
   c) Decreasing insulin.
   d) Decreasing lPxima which decreases eNOS.

5. Nutrients that are harmful to the endothelial lining (of a healthy adult) include:
   a) Polyunsaturated fats.
   b) Carbohydrates.
   c) Transfats.
   d) Simple Sugars.

6. Exercise can reduce atherosclerosis development through what mechanisms?
   a) Decreasing insulin sensitivity
   b) Increasing oxidative stress
   c) Decreasing lPxima
   d) Decreasing NO

SELF-TEST #4 (1 CEC): The following questions were taken from “The Evolution of Wellness...” published in this issue on page 14.

1. According to the U.S. Centers for Disease Control and Prevention, what percentage of American adults are not getting enough physical activity?
   a) 40%  b) 50%  c) 25%  d) 15%

2. According to the National Safety Council which of these health risks are considered modifiable?
   a) Increased stress levels
   b) Inadequate physical activity levels
   c) Poor nutritional habits
   d) All of the above

3. Medical costs can fall as much as this amount for every dollar spent on worksite wellness and disease prevention.
   a) $3.27  b) $2.50  c) $3.10  d) $2.77

4. In 2006, 19% of companies with 500 or more employees reported offering employee wellness programs. In 2008, that number increased to ________.
   a) 57%  b) 68%  c) 77%  d) 72%

5. In 2007, IHRSA introduced this Act, in an effort to make employer wellness and exercise programs tax-free and more widely recognized as a needed benefit.
   a) Health Improvement Prevention Program (HIPPP) Act
   b) Workforce Health Improvement Program (WHIP) Act
   c) Wellness Health Improvement Benefits (WHIB) Act
   d) Workplace, Homeplace, Integration Prevention Program (WHIP) Act

To receive credit, circle the best answer for each question, check your answers against the answer key on page 13, and mail entire page with check or money order payable in U.S. dollars to: American College of Sports Medicine, Dept 6022, Carol Stream, IL 60122-6022

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cash or reduced insurance premiums for participating in these programs and leading healthier lifestyles. Among the industry leaders are RedBrick Health, Tangerine Wellness, and Virgin HealthMiles. And, some big companies, like Safeway and General Electric, are experimenting independently with financial incentives to encourage employees to adopt healthy habits and to eliminate unhealthy ones. For example, General Electric employees who smoke, pay an extra $625 a year for health insurance.6

The benefits from these programs are becoming more and more obvious, with side effects such as heightened alertness, fewer injuries, and visible improvements in appearance and overall well-being. It is no wonder that more and more employers are trying to provide more access to health and wellness programs to their employees. According to a recent study conducted by MetLife,7 37% of employers now offer some type of wellness-based program, which is up from 33% in 2008 and 27% in 2005.

In light of these recent studies, it is becoming easier to illustrate the need for worksite wellness programs. A new finding in this year’s MetLife study on leveraging health and wellness programs shows staggering satisfaction results on both the employee and employer front. Results showed that in companies where health and wellness programs are offered, nearly half of employers (48%) and a whopping 58% of employees reported that these programs translate into increased productivity and employee satisfaction.7 These are very exciting times for us as health and wellness professionals. We have the opportunity to help companies keep their employees healthier, happier and more productive!

Evolution continued from page 14

ABOUT THE AUTHOR

Nikki Carosone, M.S. ACSM cPT, is a general manager and wellness specialist with Plus One Health Management in New York City. Nikki also is an associate professor of Exercise Physiology and Exercise Prescription at Long Island University, Brooklyn Campus. Her expertise is focused in the areas of wellness, physical activity, and, health promotion.

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