

PERSONAL TRAINING QUARTERLY

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ABOUT THIS PUBLICATION

Personal Training Quarterly (PTQ) publishes basic educational information for Associate and Professional Members of the NSCA specifically focusing on personal trainers and training enthusiasts. As a quarterly publication, this journal's mission is to publish peer-reviewed articles that provide basic, practical information that is research-based and applicable to personal trainers.

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FOOT PRONATION—THE EFFECT OF DYSFUNCTION IN THE LOWER KINETIC CHAIN AND CORRECTIVE EXERCISE STRATEGIES

KEITH CHITTENDEN, MS, CSCS, TSAC-F

The feet have a large influence on the performance of the lower kinetic chain (i.e., the lower extremities). Proper alignment of bones, muscles, and ligaments is essential for proper mechanics in activities such as walking, climbing stairs, and running, to name a few. When abnormal forces and improper training of the lower extremities occurs misalignment of the foot and possible injury or conditions may occur. One such condition is known as pronation of the foot. Foot pronation can create dysfunction within the lower kinetic chain and have significant detrimental effects on the strength and performance of the muscles and joints in the lower trunk and extremities of the body.

In foot pronation, the foot loses the medial longitudinal arch during weight bearing. The medial longitudinal arch is created by the shape of the bones, the ligaments, and the tendons in the medial aspect of the foot. The job of the medial longitudinal arch is to disperse ground reaction forces when the foot hits the ground. When the drop of the medial longitudinal arch occurs, the bones of the medial foot collapse towards the ground. The “spring” in a person’s step is lost because the elastic properties created by the soft tissue are greatly diminished. This low arch position is known as pronation of the foot (2,5). The position of pronation causes the foot’s alignment to drift toward the midline of the body. Prolonged pronation will affect the other parts of the lower extremities and change the alignment of the long bones of the tibia and eventually the femur (2,5,9). This change in the foot can dramatically affect the performance of the lower kinetic chain.

EFFECTS OF PRONATION

Mechanics of the foot are affected with pronation. During the gait cycle, the foot assumes different postures. When the foot hits the ground, the arch of the foot immediately absorbs the ground reaction force (the force from the ground that exerts its force on the foot). The elasticity in the foot acts as a lever which allows the foot to lower the body to the ground and prepares the foot to push off into the next gait cycle (2,5,8.) When the medial longitudinal arch is dissipated, the ability to absorb these forces is virtually eliminated. The forces from the ground are now absorbed and transmitted through the tibia and into the knee joint. This continuous process will eventually affect the knee, the hip, and even the lumbar spine. When the arch is lost in the foot, the elastic properties of the foot to push off in gait and in running are negatively affected (2,9). Normally, during the push-off phase (the last phase in the gait cycle), the foot acts like a rigid lever and propels the foot and body forward with little conscious effort from the body. Research into the muscular activity reveals more muscular activation from the gastroc/soleus complex (both the gastrocnemius and soleus muscles) in a pronated foot versus a foot with a normal arch height (2,3,9). More activation in the gastroc/soleus complex can lead to faster fatigue, tight gastroc/soleus complex, Achilles tendonitis, and knee pain.

Hyperpronation, or overpronation, involves the foot, ankle, knee, and hip. Hyperpronation can lead to bunion formation on the medial aspect of the base of the great toe. Bunions can cause

pain during walking and change the center of mass (COM) of the foot (7). One major reason for the change in the COM can be from the pain from the formation of the bunion on the base of the first metatarsal (i.e., the big toe) (7). The pain from the compression of the bunion in the athlete's shoe when striking the ground will shift their bodyweight away from the first metatarsal head. As a result of the pain, the person will avoid putting weight through the first toe and shift their COM to the second and third metatarsals (2,7). An inadvertent result of this shift from the first metatarsal head to the other toes is a newly formed altered force couple relation between the tendons in the foot and the ground reaction forces during the push-off phase in gait (7). Research has shown that the weakening of intrinsic foot muscles such as the abductor and adductor hallucis can cause significant dysfunction in foot mechanics and joint deformity (1). This change in foot mechanics can cause numerous impairments up the lower kinetic chain of the body.

The impact to the lower kinetic chain from foot pronation will interfere with performance in training, competition, and functional activities. This change in the arch of the foot will decrease arch support and create internal rotation of the tibia. Internal rotation of the knee can cause pain by increasing a valgus moment (knock-knee position) at the knee (2,5,7). The increased valgus angle of the knee will slant the patella inward toward the midline. This new position of the knee will cause an increase in the Q angle. The Q angle is an invisible line that intersects the axis of the pelvis with alignment of the femur and the patella. A normal Q angle should be very small at the hip (between 10 – 15 degrees for males and 15 – 18 degrees in females) (4). Increased Q angle of the hip alters the length-tension relationship of the ankle (peroneus longus and brevis) and the knee (biceps femoris and lateral hamstring) muscles (2,4). This altered change of muscles in the lower extremities creates a synergistic dominance (tightness) of the lateral hamstring muscles and the lateral gastrocnemius. This can lead to weakness in the medial gastrocnemius and the tibialis anterior (4). These impairments in the lower extremities can negatively affect the pelvis and the lumbar spine (5).

According to studies, an increase of pronation and drop of the medial arch of the foot has been shown to increase lumbar lordosis and create an anterior pelvic tilt in the lumbopelvic-hip complex (5). An anterior pelvic tilt will cause an altered length-tension relationship of the iliopsoas and the erector spinae muscles. This alteration causes shortened adaptations of the iliopsoas, the erector spinae muscles, and a weakening of the gluteus maximus and medius (4). This decreases the neuromuscular efficiency of the lower extremities to stabilize the lumbopelvic-hip complex during gait and running in the transverse and frontal planes (4).

A valuable takeaway message for all health and fitness professionals is that not all dysfunctions of the foot may come from muscles or joints that are intrinsically in the foot. Extrinsic muscles and joints that are within the kinetic chain of the lower body (i.e., lumbar spine, pelvis, hips, knees, and ankles) can contribute and/or cause pronation of the foot, among other conditions (2). A functional assessment that utilizes exercises such as an overhead squat should be performed by the client prior to any corrective exercise training (2). It is important for the health and fitness professional to perform a thorough initial functional

assessment of the lower kinetic chain to determine if the foot pronation is being caused by muscles or joints within the foot or external to the foot (2,5).

CORRECTIVE STRATEGIES

Fortunately, there are solutions to this problem. Altering the abnormal resting length of the lower leg by specifically stretching the gastroc/soleus complex and strengthening the anterior, posterior tibialis, and gluteus muscles may help aid in the proper alignment and strengthening of the foot during gait and running activities. It is up to the health and fitness professional to do a thorough functional assessment of the client to understand their body's movement and stabilization process in all cardinal planes of motion (i.e., sagittal, frontal, and transverse) and 3-dimensional functional capacity. Having an understanding of the client's normal physical capabilities and alignment will make finding dysfunctions in the lower kinetic chain easier to pick up and correct with proper exercise techniques.

Using the following corrective exercise strategies is a good starting point for addressing lower leg kinetic chain issues stemming from foot pronation. Tables 1, 2, and 3 serve as example and progressive procedures to help correct pronation of the foot.

STRETCHING

The first step is to stretch the tight muscles. Using a foam roller, the health and fitness professional should demonstrate to the client how to use it correctly. The correct way to use the foam roller is to start at the origin of the gastrocnemius (Figure 1). The client should then lift their body off the floor and roll distally toward their feet. The speed should be slow. The client will likely experience tenderness along the bands of the belly of the muscle that are tight. They should be instructed to stop at any tender point and hold the tension for 10 to 20 s (1). After that time, the client should continue rolling toward the feet until they reach the calcaneus. The client should be instructed to do each calf region individually. The uninvolved leg should be crossed over the involved leg during the rolling. After one calf is done, follow the same procedure with the opposite calf region.

Another anatomical structure that could be tight and often contributes to pronation is the iliotibial band (IT band). The IT band originates on the lateral aspect of the iliac crest of the pelvis and runs along the outside portion of the thigh, attaching into the lateral patella femoral joint. To foam roll the IT band, assume a side-lying position and place the foam roller at the lateral aspect of the pelvis (Figure 2).

Static stretching of the calf should follow the foam rolling. In order to stretch the gastroc/soleus complex, lean against a wall with the uninvolved leg bent in front and the involved calf in the back with a fully extended knee (Figure 3). To stretch the gastrocnemius, lean the body toward the forward bent knee, keeping the back knee fully extended. Do not allow the back leg to bend at the knee or have the heel lift off the floor. To stretch the soleus muscle the same position is assumed. The only difference to this stretch is the back knee is bent. Hold each position for 30 s and perform three sets in total. According to research, static stretching should be held for approximately 30 s in order to be effective (1,4).

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STRENGTHENING

After the client has properly stretched the tight tissues of the gastroc/soleus complex on the posterior aspect of the ankle, it is time to strengthen the intrinsic foot muscles and the anterior and posterior tibialis muscles (these muscles are located on both the posterior and anterior aspect of the ankle). The use of resistance bands or a weighted cable machine can be used for resistance (Figure 4). A prescription of three sets of 10 reps should be followed for significant change in endurance and performance of these muscles (2,7). It should be noted that clients should start with a resistance (band or weight) in which he or she can complete three sets of 10 reps with perfect execution of technique. If technique is compromised because of the level of resistance, it should be lowered so the client can complete the prescribed reps with proper technique. Progressive overload needs to be continuously provided in order to increase the strength and performance of these muscles. When it becomes easy to complete three sets of 10 reps, the resistance of the band or weight can be increased (2,5).

To strengthen the anterior tibialis muscle, seat the client on a table or mat and secure the band or foot cable accessory to the foot. Keeping the knee as straight as possible, pull the dorsum of the foot toward the body until the end point of the resistance is felt. Hold for a moment and slowly control the foot and allow it to return to the starting point. Repeat the exercise for three sets of 10 reps on each foot. To strengthen the posterior tibialis muscle, position the client either sitting or lying on a table or mat so that the medial side of the foot is pointing up toward the ceiling. If positioned on the floor, make sure the foot has adequate range of motion to be able to complete full inversion. Secure the band or resistance cable accessory around the foot, so that the line of pull from the band or cable originates from the lateral aspect of the foot (Figure 5) and pull the sole of the foot against the resistance toward the ceiling. Invert the foot to full range and slowly allow the foot to return to its starting position. Repeat for three sets of 10 reps (2,7).

Research has shown that strengthening the intrinsic muscles of the foot such as the abductor hallucis can help prevent the drop of the medial longitudinal arch (1,6). An exercise that targets the specific intrinsic muscles in the foot (i.e., abductor hallucis) is the short arch towel crunch (Figures 6 and 7). To start, have the client remove their shoes and socks. Place a towel flat on the floor in front of the client. Cue the client to focus on pulling the base of their toes toward the heel. This will inadvertently create an arch in the foot at the end of the contraction. Do not curl the toes; as this will only increase the shortening of already shortened/tight intrinsic foot muscles (6). The client should perform three sets of 10 reps on each foot.

The final exercise is for total body conditioning; it is the barbell back squat (Figures 8 and 9). The squat will strengthen the glutes, quads, anterior, and posterior tibialis muscles. This exercise should be incorporated after specific strengthening of the posterior and anterior tibialis muscles in order to bring these muscles up to speed with the rest of the body. The athlete should perform three

sets of 10 reps of the squat. The form of the barbell squat should be flawless. Making sure the client descends until the thighs are parallel to the ground, knees do not cross over the toes, toes are pointed more or less straight ahead, the spine is erect with a slight forward tilt from the hips, and the head is in a neutral position lined up with the spinal column (6).

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FIGURE 1. FOAM ROLLER ON GASTROCNEMIUS



FIGURE 2. FOAM ROLLER ON IT BAND



FIGURE 3. STATIC STRETCH OF THE GASTROC/SOLEUS COMPLEX



FIGURE 4. STRENGTHENING WITH RESISTANCE BAND



FIGURE 5. STRENGTHENING WITH RESISTANCE BAND Laterally

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FIGURE 6. SHORT ARCH TOWEL CRUNCH – START



FIGURE 7. SHORT ARCH TOWEL CRUNCH – FINISH



FIGURE 8. BARBELL BACK SQUAT – START



FIGURE 9. BARBELL BACK SQUAT – DESCENT

TABLE 1. CORRECTIVE EXERCISES—FOAM ROLLING

FOAM ROLL TIGHT MUSCLES	DURATION OF ROLLING	SETS
Gastroc/Soleus Complex	30 – 60 s	1
Iliotibial Band	30 – 60 s	1

TABLE 2. CORRECTIVE EXERCISES—STRETCHING

STATIC STRETCH TIGHT MUSCLES	DURATION	SETS
Standing Gastrocnemius	30 s	3
Standing Soleus	30 s	3
Standing Biceps Femoris (hamstrings)	30 s	3

TABLE 3. STRENGTHENING

STRENGTHEN WEAK MUSCLES	POSITION	REPS	SETS
Resisted Dorsiflexion	Seated	10	3
Resisted Inversion	Side	10	3
Short Arch Towel Crunch	Standing	10	3
Barbell Back Squat	Standing	10	3

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BUILDING A BUDGET FOR THE INDEPENDENT PERSONAL TRAINER

ROBERT LINKUL, MS, CSCS,*D, NSCA-CPT,*D

The personal training industry is full of extremely passionate people who have dedicated many years of their lives to educating themselves on all the components that make up a successful workout program. Unfortunately, many of these individuals will end up leaving the industry in part because they are not proficient in the financial and business components that could keep their company in good standing. One of the first steps to success in this ever-changing industry is learning to build and maintain a personal training budget. A well-organized budget will allow personal trainers to maintain and grow their business while tracking where their money is being spent, saved, or invested (2,4).

SETTING THE STAGE

The first step is for the trainer to define him or herself as an independent personal trainer (contractor), establish their general business plan, and develop their mission statement (4). As an independent contractor, a trainer is hired as an agent who typically rents space from a gym/facility in which they train their own clients or they establish their own training studio or facility. Independent contractors can train clients in their own homes, in local parks and/or in recreational areas; however, it is highly recommended that they carry professional liability insurance. An independent contractor is not an employee of a company; they are self-employed (1,2). They collect and self report their own wages and typically, file their taxes on a quarterly basis. It is recommended that the independent contractor file for a LLC (limited liability company) or business license to validate the legitimacy of their business.

DEFINING YOUR PROFESSIONAL NEEDS

The second step to building a successful budget is to perform a needs analysis of the business components (4,5). These components can include professional liability insurance, business license, rent, office supplies, uniforms, equipment purchases, equipment upgrades, and vehicle maintenance (if the trainer is traveling to client's homes or other venues). Some needs, however, are industry staples that must be included for any personal trainer including, but not limited to, professional membership, certification (including First Aid/CPR), recertification, continued education, and telephones.

As seen in Table 1, the trainer should list off all of their budget components and estimate how much money will be afforded for each item. Remember, components can be added, excluded, or modified every quarter or calendar year depending on need (6).

EVALUATE THE NEEDS, REEVALUATE, AND START AGAIN

The third step in creating a successful budget is reflecting back on how accurate the previous budgets were. Tracking the numbers from the previous budgets will assist in forecasting for future budgets. Forecasting can assist the trainer in adjusting categories as they can fluctuate from year to year depending on certain demands (6). For example, on a recertification year a trainer may need to budget for more continued education endeavors or a higher premium on their professional liability insurance.

Forecasting future expenditures can assist the trainer in not “overspending” during certain times of the year. The goal is to always operate in the black (profit) and maintain a consistent cushion of funds in case of emergencies (3,6). Trainers should evaluate their budget at the end of each quarter or calendar year and make educated adjustments based off their forecasting model. As business increases, net profit should increase as well and a great amount of retirement funds could be saved or invested. However, if the trainer wants to be considered professional in the eyes of their clients, they need to put money back into the business (6). This does not mean that retirement should be ignored or overlooked. It is the responsibility of each contracted independent trainer to prepare him or herself for retirement.

The cycle for forecasting, modifying, and implementing changes to the budget should be repeated at the end of every quarter or calendar year as efficient budgeting is an on-going process that will keep a business minded professional successful in this ever-changing industry.

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Robert Linkul is the National Strength and Conditioning Associations (NSCA) 2012 Personal Trainer of the Year and is a volunteer with the NSCA as their Southwest Regional Coordinator and committee chairman for the Personal Trainers Special Interest Group (SIG). Linkul has written for a number of fitness publications including *Personal Fitness Professional*, *Healthy Living Magazine*, *OnFitness Magazine*, and the NSCA's *Performance Training Journal*. Linkul is an international continued education presenter within the fitness industry and a career development instructor for the National Institute of Personal Training (NPTI).

TABLE 1. INDEPENDENT PERSONAL TRAINING BUDGET CATEGORIES – SAMPLE BUDGET

BUDGET CATEGORY	PERCENTAGE OF EXPENSES	ANNUAL AMOUNTS
Yearly Rent	13%	\$6,000
Professional Liability Insurance	1%	\$400
Professional Membership Dues and Business License	<1%	\$125
Professional Recertification - CPR, First Aid or CPT	<1%	\$35
Continued Education Self Study - Journals, books, webinars, etc.	1%	\$250
Continued Education Events - Conference registration, flight fees, room, etc.	1%	\$250
Business Cards and Schedule Books	<1%	\$75
Computer and Printer	<1%	\$250
Office Supplies	1-2%	\$500
Uniforms and Training Apparel	<1%	\$300
Telephone and Internet	3%	\$1,200
Website and Marketing	3%	\$1,500
Gas and Vehicle Maintenance	2%	\$900
New Equipment Purchase	2%	\$1,000
Clients Gifts, Rewards, Raffles, etc.	1%	\$450
Income Taxes	30-35% (on average)	\$13,500
Accounting Fee - If utilized	1%	\$350
Net Profit (Life, Vacation, Retirement, etc.)	30%	\$17,915
Total Annual Income		\$45,000
Total Annual Cost		\$27,085



SCOPE OF PRACTICE— NUTRITION AND THE PERSONAL TRAINER

RYAN ECKERT, NSCA-CPT, AND RONALD SNARR, MED, CSCS

The certified personal trainer (CPT) plays a key role in the success of clients achieving their health and fitness goals. In order for individuals to reach their desired goals, whether it is weight loss or gain, increased strength, overall health, or an improvement in athletic performance, attention needs to be paid to nutrition/diet, physical activity, and overall lifestyle interventions. Therefore, a CPT must be well qualified to guide and motivate clients through the proper exercise routine and lifestyle modifications. However, what about the nutritional piece of the puzzle? Staying within the CPT scope of practice can make it difficult to determine what type of nutrition advice is appropriate to give clients. The goal of this article is to differentiate between the various professions involved in the nutritional aspect of a client's health, explain the role of the personal trainer in regards to the administration of nutrition advice and guidance, as well as provide a practical application of the CPT scope of practice.

DEFINING THE VARIOUS ROLES INVOLVED IN NUTRITION AND DIETETICS

The Registered Dietitian (RD) is credentialed through the American Dietetic Association and has obtained a minimum of a Bachelor's degree, completed supervised clinical experiences, and has received a passing grade on a national examination (5). The RD is a licensed professional responsible for providing nutritional care for individuals through nutritional screening/assessment, diagnosis, intervention, counseling, and monitoring (4,5). The RD can work in a variety of settings in which they provide nutrition counseling and treatment of nutrition-related diseases, which can include hospitals, communities, schools, and athletic performance

facilities. The RD is the only qualified professional whom may assess an individual's nutritional status and provide specific guidance relating to specific dietary needs. The RD is an excellent source of nutrition advice as well as specific dietary guidance as they are individuals that are well qualified to do so and they must follow a specific standard of care.

The nutritionist is a term that may not carry a specific definition or regulating laws, depending upon the state in question (5). This term may refer to RDs, however, it can also refer to any individual that wishes to be called a nutritionist; in other words, this term can be used by anyone who feels that they are knowledgeable about nutrition (5). Nutritionists are not licensed or certified to provide individuals with dietary counseling or offer treatment for nutrition-related diseases by any specific governing body. Again, this may depend upon the individual state laws and regulations. An individual claiming to be a nutritionist should be approached for nutrition advice with caution because this term carries no specific meaning and does not provide a scope of practice or standard of care.

A CPT, as defined by the National Strength and Conditioning Association (NSCA), is an individual who assesses, motivates, and educates clients regarding their health/fitness needs (2). The CPT uses an individualized approach, designs safe and effective exercise programs, responds appropriately in emergency situations, and refers clients to other healthcare professionals when necessary (2). In regards to nutrition, a CPT is qualified to provide basic education regarding nutrition concepts and recognize when referral to a healthcare professional or RD

is necessary (1). A CPT is a great source of basic nutrition information such as recommended dietary and caloric intakes for the general population as well as recommended calorie intakes for weight loss or gain. However, a CPT is not qualified to assess an individual's nutritional status and provide specific dietary prescriptions.

THE CPT SCOPE OF PRACTICE

It has been well established that a client's potential for success attaining health and fitness goals relies on their ability to engage in sufficient amounts of physical activity, to consume a diet consisting of adequate energy intake, and to live a healthy overall lifestyle. All three of these components must be present in order to maximize the chances that a client will be successful. The CPT plays an important role in each of these three components. The CPT assesses, guides, and motivates clients through the appropriate exercise program. The CPT motivates clients to make the necessary behavioral changes to live a healthy lifestyle. The CPT also plays a critical role in providing clients with appropriate nutrition advice, making sure to stay within the established scope of practice. While providing specific exercise prescriptions and lifestyle modifications is well within the scope of practice of the CPT, providing specific dietary analysis and dietary prescription is not. These duties should be performed by an RD. However, the CPT can provide general, helpful nutritional advice to clients and should be able to recognize when to refer to an RD for a more specific dietary evaluation or prescription.

It is important that the CPT recognize his or her own limitations in regards to nutrition. However, it is just as important that the CPT be aware of the many benefits that increasing a client's nutritional knowledge can have on their progress. Clients often obtain their nutritional information from popular health and fitness magazines, television programs, news articles, and the internet. While these sources can provide a great deal of information, they can also be unreliable. This can be difficult to determine at times; thus, the CPT can be an invaluable resource for clients by providing research-based and well-established nutritional information. The CPT is often the first person that a client will come to with nutritional questions. Therefore, the CPT must be able to provide clients with the facts relating to nutrition and diet without going beyond their scope of practice.

The CPT should also be aware of how to approach nutritional advice with athletes, bodybuilders, physique, figure, and bikini competitors effectively while staying within their scope of practice. The potential success of an athlete in competition or a fitness competitor on stage is largely determined, not only by their training, but by their diet. Therefore, it is common for these individuals to follow an individualized meal plan designed to optimize their performance and their physique. It is all too common that a strict dieting regimen is "prescribed" by a coach or trainer resulting in carb or fat depletions, high-protein intakes, and crash dieting and dehydration. Therefore, coaches and trainers should only provide these individuals with general nutritional advice and recommendations, following the same guidelines as those described for the general population. However, only a RD should provide athletes with individualized meal plans that can supplement and enhance the effectiveness of their training routines.

It is also important for the CPT to be aware of their state's laws and regulations relating to the provision of nutrition advice. Certain states may have laws restricting the provision of specific nutrition advice and guidance to RDs or licensed nutritionist professionals (2). However, other states may not have any such laws or regulations. In cases such as these, the scope of practice as defined by the CPT's certifying organization (e.g., NSCA, NASM) should be followed for ethical, moral, and liability reasons.

CONCLUSION

The CPT provides clients with guidance and motivation through appropriate exercise programs, facilitates healthy behavioral and lifestyle modifications, and provides generalized nutritional advice in order to promote the potential success of a client in achieving their health and fitness goals. The CPT has a specific scope of practice in regards to the provision of nutrition advice and guidance that is often found to be confusing. When providing clients with nutrition advice, the CPT should be well aware of their scope of practice as defined by their certifying organization, as well as the regulations and laws discerning nutrition and dietary advice. With the appropriate education and training through an undergraduate and/or graduate degree in conjunction with a certification through an NCCA accredited organization, CPTs may be qualified to provide clients with sound nutrition advice and, therefore, be better able to provide clients with the necessary tools to be successful.

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SCOPE OF PRACTICE— NUTRITION AND THE PERSONAL TRAINER

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TABLE 1. RECOMMENDED GUIDELINES FOR APPROPRIATE SCOPE OF PRACTICE

APPROPRIATE NUTRITION SCOPE OF PRACTICE BY THE CPT
• Providing education on general nutrition concepts (e.g., recommended macronutrient intake for health, role of various nutrients in the body, role of fluids in the body, etc.) • Providing calorie intake ranges for weight loss and weight gain using established energy intake estimation equations • Administering a generalized dietary assessment (24-hour recall, 3-day diet record) and comparing it to government nutrition websites (e.g., MyPlate.gov) • Providing examples of foods and food groups to include before and after a workout • Comparing a client's macronutrient intake to established macronutrient distribution ranges
INAPPROPRIATE NUTRITION SCOPE OF PRACTICE BY THE CPT
• Performing specific dietary assessments on clients and evaluating them for nutrient deficiencies (e.g., micronutrient deficiencies) • Providing nutrient recommendations, including supplement intake and micro/macronutrient intake, for clients with a diagnosed disease (e.g., cardiovascular disease, diabetes); this is referred to as Medical Nutrition Therapy • Providing individualized meal plans with specific macronutrient and micronutrient prescriptions • Prescribing various “fad” diets to individuals (e.g., the Paleo Diet™, the Atkins Diet™, the Ketogenic diet, etc.) as well as established, evidence-based diets (e.g., the DASH diet, the Mediterranean diet, etc.)

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BUILDING YOUR BUSINESS: SELLING IS NOT SELLING OUT



MARK NUTTING, CSCS,*D, NSCA-CPT,*D

Being a good personal trainer does not ensure that you will have clients. You need to be able to sell the benefits and achievable results of using your services in order to build your business. Selling, for many, may bring to mind car salesmen, infomercials, and telemarketers. This can create a mindset for trainers that selling makes them somehow less honest or acting in their own self interest when trying to get someone to purchase a program. In fact, we

all sell every day and enjoy it. When we recommend where to eat, which movie to watch, what book to read, we are selling. Learn how to make the act of selling personal training programs a natural, positive experience for you and your potential client. Build your business by helping others, and help them by getting them to commit to your program.



HIGH-INTENSITY INTERVAL TRAINING—EFFICIENT AND EFFECTIVE

PAT MAHADY, MS, CSCS

High-intensity interval training (HIIT) describes any workout that alternates between intense bursts of physical activity and periods of less intense physical activity or rest. This type of training is a practical means of training for a wide variety of populations due to its minimal time commitment requirement and its effectiveness in inducing skeletal muscle metabolic and performance adaptations that resemble traditional endurance training despite a low total exercise volume (5). This type of training has become so popular that it is the top fitness trend of 2014 supplanting bodyweight-based training and Zumba® (7).

Long-standing traditional approaches to exercise can be time consuming. Running or cycling for hours each week are effective strategies for improving fitness and maintaining weight but remain impractical for many populations. Time constraints imposed by the responsibilities of work, commuting, and personal obligations remain barriers to participating in and maintaining consistent exercise programs.

Research supports the ever growing body of evidence that adaptations to training can be achieved in as little as three 20-min sessions of high-intensity exercise per week (5). The intense work periods may range from as little as 5 s to 8 min long, and are performed at 80% to 95% of a person's estimated maximal heart rate (4,5). The recovery periods may range from 40 to 50% of a person's maximal heart rate to as little as brief periods of complete rest. The intervals for recovery are variable and often dictated by the intensity of effort but may equal those periods

spent in all out physical effort. In other words, a one-to-one work-to-rest ratio for as little as 20 minutes can provide for a great amount of training adaptation.

The benefits of HIIT are numerous. In addition to its time efficient nature, the improvements in both aerobic and anaerobic fitness are well supported. In a study published in 2006, cyclists subjected to six sessions of four to seven all-out, 30-s cycling efforts, interspersed with 4 min of recovery improved muscle oxidative potential, muscle buffering capacity, and muscle glycogen along with doubling aerobic endurance (1). HIIT may also improve overall cardiovascular health by reducing blood pressure, improving insulin sensitivity, and improving cholesterol profiles. In another study published in 2013, 43 healthy men and women participated in activities based on HIIT principles. After the 10-week study, all 43 individuals showed improvements in their body composition and aerobic capacity from their initial levels (6).

This type of training can appeal to a variety of populations with differing expectations. For the well-trained athlete, improvements in endurance can be achieved through HIIT training. This is especially important to these athletes because the threat of injury associated with logging additional or excessive miles over longer periods can increase over time. HIIT can be an efficient means of pushing the aerobic uptake just that little bit extra while limiting the risk of injury and maximizing time.

For the average working professional, HIIT provides enough of a stimulus to produce immediate and noticeable changes in body fat, musculature, and an overall healthy appearance while not interfering with the obligations of work or family. The immediate gains associated with HIIT can also provide extra motivation to commit as opposed to a traditional program that may have failed in the past.

In addition, HIIT may be safe and effective for an elderly population because the prescriptive modes may be as simple as using a person's bodyweight without any additional equipment or external resistance while achieving similar results. In support of the elderly client, HIIT may not have to be an all-out activity in order to get results. More research needs to be conducted on the effectiveness of HIIT for this population, however.

The beauty of HIIT lies in its physiology. During an intense bout of activity, all three energy systems supply some portion of the energy needed (2). The intensity and the duration of the activity dictate the percent contribution of each of the energy systems. It is estimated that during a sprint activity of approximately 100% effort, the aerobic system provides around 3% of the energy needed (2). The glycolytic system provides around 10% of the energy needed but the majority of the energy comes from the phosphogen (ATP-PC) system (2). Since the majority of the energy provided during HIIT comes from the two anaerobic energy systems, their percent contribution can be manipulated by adjusting the duration and intensity in order to meet the desired training goals.

After an intense bout of exercise, these energy systems must be replenished. It is the responsibility of the aerobic energy system to replenish the anaerobic glycolytic and ATP-PC energy systems for future activity. The deep breathing experienced following an intense bout of physical activity is used to replenish these systems. An oxygen debt has been created as a result of the activity and that debt must be satisfied. The breathing experienced post-activity is above the resting value and is called excess post-exercise oxygen debt (EPOC) (2). EPOC will continue until that debt is satisfied. The length of time it takes to recover is commensurate with the intensity and duration of the activity (3).

Repeated bouts of HIIT can lead to a variety of adaptations that improve conditioning and athletic performance. Enzymatic changes associated with all three energy systems have been observed and the ability to recognize the percent contributions of each of the energy systems, and how they may be recruited according to the manipulation of the acute program variables, is vital knowledge to the trainer who wishes to employ this type of training.

While the results of research studies on HIIT support its effectiveness at providing a training adaptation, the knowledge we do have provides very little basis for generating programming guidelines. Knowing work-to-rest ratios is critical in prescribing HIIT for any athlete or client. Short duration, high-intensity exercise requires a greater work-to-rest ratio to prevent injury while lower intensity, longer duration exercise will require a decreased work-to-rest ratio to induce adaptations (3). Manipulating the programming variables that are vital to every exercise prescription, and understanding their impact on the

body's energy systems is vital. Table 1 should be used as a guideline for work-to-rest ratios and maximizing training for specific energy systems.

Keep in mind also that, complete rest between work intervals may be warranted in some situations. Activity between work intervals at 90% intensity or above may interfere with the recovery of the ATP-PC system, especially during heavy resistance training (3). For other work-to-rest ratios, it appears that light activity hastens the body's ability to recover. The aerobic energy system's contribution to the recovery of adenosine triphosphate (ATP) and the removal of accumulated lactic acid is enhanced if the recovery effort is well below the intensity of the work (2,3). Some research suggests that recovery effort at 25% of peak oxygen consumption is superior to active recovery efforts of a greater percentage (3).

IMPLEMENTATION CONSIDERATIONS

Caution should be used when implementing a HIIT exercise prescription, however. Because of its intense nature, any person wishing to participate in HIIT should be medically evaluated and cleared to participate. This would include a review of a person's family history and lifestyle habits like cigarette smoking, hypertension, diabetes, cholesterol levels, and body mass index. Prior to beginning HIIT, it would be wise for the individual to establish a foundation of fitness, which would include a solid aerobic base, a foundation of strength, and flexibility. Since the majority of exercises associated with HIIT are compound movements, learning the proper form to performing these lifts may help minimize injury risk and maximize results. It's worth mentioning that HIIT can be performed with a variety of activities ranging from bodyweight exercise circuits, to barbell complexes, to sprint running, to sprint cycling. Start with a single session of HIIT with the initiation of training. This is a great time to establish a HIIT foundation and an even better time to identify areas of weakness. Try not to progress quickly. It is suggested to limit the progression to no more than two HIIT sessions within a 10-day period for novice athletes or beginners. Because of the intensity of HIIT, it is important to try to maximize recovery between sessions as well.

Trainers are continuously challenged with creating training programs that are challenging and rewarding. A well designed and implemented HIIT program is an opportunity to motivate individuals and improve adherence to exercise. Safety in participation should always be a priority and individuals should focus on finding their own optimal level of intensity and preference of movements. Humans are competitive by nature, so resist the temptation to exercise at levels that are above one's abilities or to perform movements that are new and not well learned.

With HIIT, not having enough time to exercise is no longer an excuse. The benefits are clear and with its ever-growing popularity, this often-underutilized method of training just may become the future to our modern society's health and wellness.

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TABLE 1. USING INTERVAL TRAINING TO TRAIN SPECIFIC ENERGY SYSTEMS (2)

% OF MAXIMUM POWER	PRIMARY SYSTEM STRESSED	TYPICAL EXERCISE TIME	RANGE OF WORK-TO-REST PERIOD RATIOS
90-100	Phosphagen (ATP-PC)	5-10 seconds	1:12 to 1:20
75-90	Fast Glycolysis	15-30 seconds	1:3 to 1:5
30-75	Fast Glycolysis and Oxidative	1-3 minutes	1:3 to 1:4
20-30	Oxidative	>3 minutes	1:1 to 1:3



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COMPLEX SET VARIATIONS— IMPROVING STRENGTH AND POWER

CHAT WILLIAMS, MS, CSCS,*D, CSPS, NSCA-CPT,*D, FNSCA

Exercise selection, order, and combination of movements are important variables for improving overall fitness and performance. In addition, supersets, compound sets, and complex sets can be incorporated into a strength and conditioning program to increase intensity, add variety, and enhance the overall training program for the individual. Incorporating one or all these variations can impose more demand on the individual, improve time efficiency completing the routine, and provide an additional challenge for a well-conditioned client (1).

Supersets involve two exercises, which stress opposing muscles. An example would be completing a set of 10 repetitions on the bench press (chest, shoulders, and triceps), and then followed by a set of 10 bodyweight pull-ups (back and biceps).

Compound sets involve two exercises that stress the same muscle groups. An example would be completing a set of 10 repetitions on the lat pulldown (vertical pull for back muscles), and then followed by a set of 10 repetitions on the seated low row (horizontal pull for back) (1).

Complex sets take a step further by combining a strength movement with a power movement, in which the movements are biomechanically similar in the overall movement patterns. An example would be completing a set of eight repetitions of barbell squats, and then followed by a set of five repetitions of bodyweight squat jumps (2). A third exercise, similar in movement and the muscles targeted, can be added to create a “complex triad” (2).

These variations can be performed bilaterally and unilaterally depending on the fitness level and training age of the client. Adding the complex sets for the well-trained individual may produce improvements in the psychomotor, neurological, and muscular systems through postactivation potentiation (PAP), thereby potentially increasing force production and rate of force production (2,3). Increasing muscular activation and contraction, which can lead to an increase of fast-twitch muscle fibers, can play a role in muscular strength and power adaptations over time (2). The following are multiple examples of exercises that could be incorporated into a training program to create complex sets.

EXAMPLES FOR LOWER BODY COMPLEX SETS BODYWEIGHT SQUAT JUMP (FIGURES 1 AND 2)

Start with feet shoulder-width apart preparing to squat. Lower the body to a half squat (loading the hips) and jump explosively by performing triple extension with ankles, knees, and hips. Land in the starting position with “soft” knees and ankles while under control. Maintain posture by keeping the core tight.



FIGURE 1. BODYWEIGHT SQUAT JUMP – START



FIGURE 2. BODYWEIGHT SQUAT JUMP – EXECUTION

BOX JUMP VARIATIONS (FIGURES 3 – 7)

Start with feet shoulder-width apart preparing to squat. Lower the body to a half squat (loading the hips) and jump explosively by performing triple extension with ankles, knees, and hips. Land on top of the box with feet facing forward and knees slightly bent. The landing should be soft with minimal noise made by the feet.



FIGURE 3. BOX JUMP – START



FIGURE 4. BOX JUMP – LANDING

Progressions can be incorporated by adding unilateral landing and hops onto the box. Starting with jumping from two feet and landing with one on the box (Figures 5 and 6). Then hopping and landing with one foot (Figure 7). Landing techniques stated above should be applied to both of these movements as well.



FIGURE 5. BOX JUMP VARIATION – START



FIGURE 6. BOX JUMP VARIATION – UNILATERAL LANDING



FIGURE 7. BOX JUMP VARIATION – UNILATERAL START

COMPLEX SET VARIATIONS—IMPROVING STRENGTH AND POWER

SLED VARIATIONS (FIGURES 8 – 10)

When performing the sled push, grasp the handles or base of the sled with the arms fully extended and drive the legs powerfully by extending the knees and hips (Figure 8). When finished driving the sled the desired distance, the sled can then be pulled back to the start using the attached rope (Figure 9). The individual should keep their shoulders back and chest out using the back and biceps to pull the sled back. The last sled variation is completed using a harness attached to the upper body (Figure 10). Once attached, sprint forward with shorter strides and gradually increase the stride length over the first 10 yards. Keep the back neutral and raise the hips gradually over the first 10 yards as well.



FIGURE 8. SLED PUSH WITH ROPE



FIGURE 9. SLED PULL WITH ROPE



FIGURE 10. SLED PULL WITH HARNESS

LEG PRESS (STRENGTH) (FIGURE 11)

The leg press can be performed bilaterally or unilaterally (Figure 11). Lower the weight by flexing the knees and hips, and then return the weight to the top by extending at the knees and hips.



FIGURE 11. LEG PRESS – UNILATERAL

LOWER BODY COMBINATIONS

Complex sets can be developed by combining lower body strength movements with any of the above power movements. For example, a barbell squat or leg press can be paired with a squat jump or box jump. Intensity can be increased by raising the box or adding a weighted vest to the squat jumps. Once bilateral movements are mastered, unilateral exercises can be paired together starting with a single-leg press and a single-leg box jump. Bilateral and unilateral exercises are also interchangeable depending on the goals for the routine that day. The “complex triad” incorporates a third exercise, so the client may start with leg press, then a sled push, and finish it up with a box jump.

UPPER BODY COMPLEX SETS

INCLINE PRESS (STRENGTH) (FIGURE 12)

The incline press is an example of upper body strength movement using the chest, shoulders, and triceps.



FIGURE 12. INCLINE PRESS

PLYOMETRIC PUSH-UP (FIGURES 13 AND 14)

Start in push-up position with the chest on the floor. Explosively push off the floor breaking contact from the floor with the hands landing directly under the shoulders with arms extended.



FIGURE 13. PLYOMETRIC PUSH-UP – START



FIGURE 14. PLYOMETRIC PUSH-UP – OFF THE FLOOR

POWER PUSH-UP (FIGURES 15 AND 16)

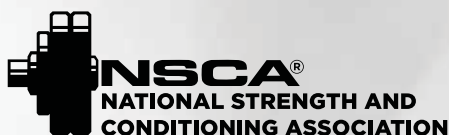
Start in a push-up position with the chest directly over the medicine ball. Explode off of the ground landing on the medicine ball with the arms extended.



FIGURE 15. POWER PUSH-UP – START



FIGURE 16. POWER PUSH-UP – FINISH



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COMPLEX SET VARIATIONS—IMPROVING STRENGTH AND POWER

POWER PUSH-UP WITH BALANCE TRAINER AND MEDICINE BALL (FIGURES 17 – 19)

Start with one hand on the balance trainer and the other on the medicine ball. Explosively drive off the balance trainer and medicine ball to perform a push-up, and then slide the hands over to switch positions. It should be alternated so that each hand has to drive off the balance trainer every other repetition.



FIGURE 17. POWER PUSH-UP WITH BALANCE TRAINER AND MEDICINE BALL



FIGURE 18. POWER PUSH-UP WITH BALANCE TRAINER AND MEDICINE BALL



FIGURE 19. POWER PUSH-UP WITH BALANCE TRAINER AND MEDICINE BALL

SUPINE MEDICINE BALL CHEST PASS (FIGURES 20 AND 21)

The client will lie on their back as the trainer or partner stands above on a box holding a medicine ball. The trainer or partner will drop the ball to the client around chest level. The client will then catch and explosively return the ball with a chest pass back to the trainer or partner.



FIGURE 20. SUPINE MEDICINE BALL CHEST PASS – START



FIGURE 21. SUPINE MEDICINE BALL CHEST PASS – CATCH

UPPER BODY COMBINATIONS

Complex sets can be developed with several types of strength movements including bench press, incline press, cable chest press, and dumbbell press. An example would be to perform a set of eight repetitions on bench press followed by a set of five plyometric push-ups. Intensity can be increased by adding the balance trainer or medicine ball paired with the bench press or one of the other upper body strength movements that is a pushing movement. A “complex triad” example would be a dumbbell press, followed by a power push-up, finishing with a supine medicine ball chest pass.

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HELPING MOTIVATE RESISTANT CLIENTS— MOTIVATIONAL INTERVIEWING SKILLS FOR PERSONAL TRAINERS

JOHN LOTHES II, MA

As trainers, there may come a time when our clients begin to plateau in their improvements, or just flat out lose their motivation to continue. How can we as trainers help these individuals? We are already providing them with the tools that they need to build a better, healthier life through exercise and nutritional knowledge. The answer may lie in motivation interviewing.

The concept of motivational interviewing (MI) was designed by Bill Miller and Stephen Rollnick for motivating addicts into recovery. The philosophy behind MI is to use motivations to change their behaviors (2). This is done by developing a discrepancy, as well as exploring and resolving ambivalence within the client. MI recognizes and accepts the fact that clients who need to make changes in their lives approach fitness training at different levels of readiness to change in their behavior (3). MI attempts to increase a client's awareness of potential problems that may arise from their current behaviors through a non-judgmental and non-confrontational approach (2). By using MI questioning, trainers may help clients see a better future, and become more motivated to achieve their goals. The idea is to help clients think differently about their behavior and consider what might be gained through a positive change (1,2).

ASPECTS OF MOTIVATIONAL INTERVIEWING

1) Express Empathy: This is done by sharing with the client that you understand their perspective. By asking open-ended questions, we can use reflective listening to affirm what the client is feeling. We want to try to mirror what the client is

telling us. This creates a sense of safety for the client and deepens the conversation that you are having with them. Reflective listening and empathy may also help clients understand themselves better.

Statements such as, "I hear you," "This is important," "Please tell me more," "I'm not judging you," "You are very courageous to be so revealing about this," and "You've accomplished a lot in a short time," can really help build rapport with clients (1,2,4).

2) Develop a Discrepancy: This helps the client appreciate the value of the change by exploring the discrepancy between how they want their lives to be versus how they are currently living their lives.

- Compare positives and negatives of behavior.
- Explore positives and negatives of changing in light of goals. This can be done by exploring pros and cons of behaviors with clients.
- Try to elicit self-motivational statements. Try to get the client to come with their own statements instead of you providing ones for them (1,2).

3) Roll with Resistance: This concept is about being able to accept the client's reluctance to change as being natural rather than stubborn. They are trying hard to make changes in their life. As trainers, we need to be able to accept that even though we may know what is good for them resistance is a natural part

of change. Instead of confronting the client or arguing with them, try to change strategies in response to the client's resistance.

- Acknowledge reluctance and ambivalence as understandable and a natural human response to change.
- Reframe statements to create a new momentum towards a healthier lifestyle.
- Engage the client in problem solving with you. If you can get the client to come up with solutions on their own, they are more likely to stick to them more so than if you came up with them. Or, at least try to bring the client into the problem solving and do it as a team (1,2).

4) Support Self-Efficacy: This aspect is simply being able to embrace the client's autonomy, even when the client chooses not to change, and to help the client move towards change successfully and with confidence.

- Try to help the client develop a sense of responsibility and an ability to succeed.
- Offer options to the client to help develop hope.
- Help develop a sense of optimism by asking questions like, "What difficult goals have you achieved in the past?" and "What might work for you if you did decide to change?"

The main goals of motivational interviewing are to establish rapport, elicit change talk, and establish commitment language from the client. Motivational interviewing is not about telling the client what to do. We all know how it feels when people tell us what to do. This is neither effective for them nor your relationship with them (1,2).

AVOID THE "BUTS" ...:

Empathic statements are often followed by negative criticism of others or ourselves with "but" statements. For example, "I'm proud of how you have avoided going to, and over eating at, buffets, but you still need to ..." could be changed to "I'm proud of how you have avoided over eating out at buffets. Tell me how you think you could further improve your diet," (1,2,4).

AVOID ARGUING:

Arguing with clients about poor lifestyle habits can often lead to arguments and a loss of rapport. "When are you going to stop pestering me about smoking?" Our tendency is to argue about the importance of stopping these lifestyle habits like stopping smoking, for example. Trainers need to assist in wording a more non-argumentative approach that creates more dissonance in the client. This is also a great place to look at pros and cons of behaviors with clients instead of arguing with them about their unhealthy behaviors and habits. Examples might include:

- "It sounds like you aren't ready to stop smoking. I want you to know that if you change your mind, there are several ways that I could be of assistance. I am really concerned about what can happen to your health if you continue to smoke."

- Alternatively, we may ask: "What might be some advantages of quitting or cutting down?" (1,2,4).

USING THE MOTIVATIONAL RULER:

By continuing with the smoking example, we can use a motivation ruler to see where the client is in their motivation to change their behavior. We can do this by asking questions such as:

- On a scale of 0 to 10, how important do you think it is for you to quit?
- Why didn't you say (1 or 2 points lower)?
- On a scale of 0 to 10, how important is it for you to change your (behavior)?
- Why didn't you say (1 or 2 points lower)?

The motivational ruler allows us to get a feel for where our clients are in their motivation to change. We can also ask such questions as "What would it take to move this ruler one or two points in the desired direction?" (1).

EXAMPLES OF HOW TO USE MOTIVATIONAL INTERVIEWING QUESTIONS

Often, clients will come in upset and frustrated with their trainers because they have not met their goals. This is an excellent opportunity to see where the client is and where they want to go in their training goals. Let us look at some examples and example statements that we might use in these situations. The principles of MI that have been used for many years with substance abuse statements can be translated to exercise and eating behaviors and habits as well. Below are some suggested examples from the U.S. Department of Agriculture and the Center for Substance Abuse Treatment when using MI statements with clients that you are working with to help engage them in healthier exercise and eating habits (1,4,5).

1) Client comes in frustrated because they have not met their weight loss goals. By using reflective listening statements or by expressing empathy we can align with the client and work towards achieving their goal (1,4,5).

SOME STATEMENTS MIGHT INCLUDE:

"You're feeling uncomfortable with your (ex: weight)."

"You've tried to do _____ before and it has not worked for you."

"You are wondering if you should do something about _____."

"I can see how you might feel 'frustrated/ angry / like giving up / etc.' at this point."

"You're feeling uncomfortable with your slow progression in weight loss."

"You are angry with/about not losing as much as you wanted to by this time."

HELPING MOTIVATE RESISTANT CLIENTS— MOTIVATIONAL INTERVIEWING SKILLS FOR PERSONAL TRAINERS

“So, if I understand you so far, you are feeling frustrated because you are not losing weight as fast as you wanted to.”

“You are wondering if you should do something about not losing weight as quickly as you would have liked to.”

2) Client tells you that they are continuing to eat whatever they want and can't stop (1,4,5). Here is an opportunity for the trainer to develop a discrepancy between the client's goal and their current behavior.

SOME STATEMENTS MIGHT INCLUDE:

“You have said that you know (ex: eating ice cream every night) is not the best choice, but that it fits with your lifestyle. What are some of your concerns about fitting _____ into your current lifestyle?”

“What is it about your _____ that others may see as reasons for concern?”

“What makes you think that you need to make a change?”

“If things worked out exactly as you like, what would be different?”

“If you decided to change, what do you think would work for you?”

“What concerns do you have about making changes?”

“What things make you think that this is a problem?”

“What difficulties have you encountered trying to change your _____?”

“You have said that you know losing weight is the best choice, but also that it won't fit with your lifestyle. What are some of your concerns about losing weight that will change your current lifestyle?”

“How has eating whatever you want stopped you from doing what you want to do?”

3) Client says that they have not been doing any exercise outside of their meetings with their personal trainer (1,4,5).

Here is an opportunity for the trainer to make statements and ask questions that allow us to “Roll with the Resistance” between the client's goal and their current behavior.

SOME STATEMENTS MIGHT INCLUDE:

“You are right. I am concerned about your (ex: not exercising outside of our sessions), however you are the one in control.”

“You're feeling uncomfortable with _____, but what would it take to get you to exercise outside of our sessions?”

“It's okay if you don't think any of these ideas will work for you, perhaps you've been thinking about something that might work instead?”

“You are right. I am concerned about your exercise, but you are the one in control. Is there an agreement that we can agree on together to get you motivated to exercise?”

“You're feeling uncomfortable with your exercise regimen.”

“I don't understand everything you are going through, but if you want to share what you've tried, maybe together we can find something that could work for you.”

“Would you like to talk about some ideas that have worked for others and use what works for you?”

4) Client expresses frustration with all the work they are doing but not seeing any results (or desired results) and wants to give up. Here are some questions we can use to help support self-efficacy (1,4,5):

“How much do you want to _____?” and “How confident are you that you can make this change?”

“What encourages you that you can _____, if you want to?”

“I know that it seems like such an uphill battle to _____, but now that we've discussed some options that have worked for other individuals, which ones sound like the best fit for you?”

For example: “I know that it seems like such an uphill battle to work out, but now that we've discussed some options that have worked for other individuals, which ones sound like the best fit for you?” “It sounds like you want to continue to _____. What personal strengths do you have that will help you succeed? Who could offer helpful support so you can continue to _____?”

For example: “It sounds like you want to continue to work out. What personal strengths do you have that will help you succeed? Who could offer helpful support so you can continue to work out?” “What encourages/motivates you so that you can exercise, if you want to?”

5) A client comes in and talks about how well they are doing and how good they feel. Here is an excellent chance to use statements and questions for reinforcing positive change-talk, self-efficacy, and new behaviors (1,4,5).

SOME STATEMENTS MIGHT INCLUDE:

“That sounds like a good/great idea.”

“That's a good/great point.”

“You've really changed the way you _____. How do you feel about that?”

We do not necessarily have to be psychologists to be able to use the MI model and skills to try to help move our clients toward a direction of a healthier lifestyle. Many people that come to personal trainers are already self-motivated and want to live

better and healthier lives; they just do not possess all the tools necessary to make those changes. These types of questions can help point them in the right direction as well as help them find their own direction in their well-being. Part of our jobs as trainers is to help teach our clients about appropriate health habits, but also to help keep them on track even when motivation may be slipping for them.

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OPTIMIZING ATHLETIC PERFORMANCE— ARE CARBOHYDRATES NECESSARY?

DEBRA WEIN, MS, RD, LDN, NSCA-CPT,*D, AND NICOLE SCHULTZ, MS, MPH

Despite its poor performance in the United States News and World Report “Best Diets 2014” rankings, the Paleolithic diet has been growing in popularity among the general and athletic communities (10). Known as the Paleo Diet™, it recommends eating patterns similar to those of our Paleolithic ancestors, which included wild animals and plant-based foods. While the Paleo diet parallels the dietary guidelines with respect to lean protein, healthy fat, and fresh fruits and vegetables, it completely restricts dairy and grains, both of which have been integral components of athletes’ eating regimens for decades. Yet proponents of the Paleo diet for athletes argue against the need for traditional “carbo-loading” for performance and claim that a low-carbohydrate eating regimen can be beneficial for athletes (2). Their argument is based on the body’s ability to adapt to the altered macronutrient composition of the diet by enhancing reliance on fat oxidation for energy. The Paleo diet is just one example of recent diets that recommend specific eating patterns astray from traditionally accepted guidelines. Before sports nutritionists and coaches begin prescribing eating recommendations to athletes that are unconventional from traditional standards, it is important to consider the scientific evidence supporting a low-carbohydrate diet for boosting athletic performance.

THEORY—ORIGIN AND ARGUMENTS

A landmark study published in 1983 by Phinney et al. demonstrated the ability of well-trained cyclists to maintain endurance performance after adaptation to a four-week, low-carbohydrate diet, of which 83 – 85% of total calories came from fat (7). Surprisingly, the cyclists did not experience impaired endurance performance following the diet and, more importantly, data showed a dramatic shift in muscle substrate utilization, as demonstrated by a decreased respiratory quotient, reduction in muscle glycogen mobilization, and reduced blood glucose oxidation (7). This study serves as a foundation for modern day low-carbohydrate diet advocates. Adaptation to a low-carbohydrate diet should enable endurance athletes to use their abundant fat reserves for fuel, reducing reliance on endogenous carbohydrates and the need for exogenous sources of carbohydrates during prolonged endurance sports. Not only do they cite muscle glycogen sparing via enhanced

fat oxidation, but proponents also argue that low-carbohydrate diets could aid in recovery due to the suppression of oxidative stress (6). Furthermore, observational and case studies have demonstrated associations between marathon running and coronary atherosclerosis—a topic that made headlines across the nation recently (5,8). Since marathon runners typically ingest large quantities of carbohydrates during training and competition, the recent observations called into question the long-term belief of high-carbohydrate diets as beneficial for athletic performance, further supporting the low-carbohydrate diet trend.

STATE OF THE EVIDENCE

While research has been suggestive, the evidence for following a low-carbohydrate diet to boost athletic performance remains weak. In 2005, researchers investigated the evidence for effects of high-fat (low-carbohydrate) versus high-carbohydrate diets on endurance performance. While they reported that endurance performance was moderately prolonged after a high-carbohydrate diet compared to a high-fat diet, they also noted that, due to the heterogeneity across trials, “a conclusive endorsement of a high-carbohydrate diet for improved athletic performance is difficult to make,” (3). Contributing to the uncertainty, the small number of additional studies that examined low-carbohydrate diets on performance since then have produced conflicting and inconclusive results (all for varying reasons) (6). Low-carbohydrate proponents argue that these studies did not give subjects adequate time to adapt to the new eating regimen. Without time for adaptation, the experiments could be biased toward showing no performance advantage following a low-carbohydrate diet. While this may be true, strong evidence in favor of low-carbohydrate diets remains absent. Despite showing enhanced fat oxidation during exercise, some studies suggest low-carbohydrate diets may negatively impact chronic adaptations to training, carbohydrate utilization, and capacity for high-intensity exercise performance (1). Additionally, whether the metabolic differences in muscle following a low-carbohydrate diet translate into functional changes and improved athletic performance outcomes remains unknown (1). Although faster recovery has been anecdotally reported by athletes following low-carbohydrate regimens the hypothesized explanation for the suppressed oxidative stress and enhanced recovery has only been demonstrated in mice (6,9).

MOVING FORWARD

In 2003, Asker Jeukendrup stated in a research article examining high- versus low-carbohydrate diets that, “there is very little or no evidence to support the use of high-fat diets,” (4). Limited evidence has surfaced to refute his statement, and a tremendous gap in the literature remains. Not only is the impact of a low-carbohydrate diet on performance inconclusive, but we lack research on its effect on weight control, training performance, recovery, immune function, injury risk, or capacity to concentrate (6).

Until robust studies emerge to clarify the uncertainty, it is important to keep three points in mind. First, there is a lot of variation among athletes, eliminating the possibility of a “one size fits all” approach. Secondly, an athlete’s performance goals must be considered prior to exploring a low-carbohydrate diet. With a majority of the literature focusing on endurance performance, the ability to conserve carbohydrates might come at the expense of limited anaerobic capacity, potentially due to restricted substrate mobilization or fiber recruitment for high-intensity work (7). Therefore, low-carbohydrate experimentation might not be appropriate for some athletes. Lastly, regardless of metabolic adaptations to diet, carbohydrate availability remains the primary limiting factor for performance during prolonged submaximal or intermittent high-intensity exercise (1). In the midst of immense uncertainty, one thing is clear: there is a need for more research. Until then, the following recommendations can be made (1):

- Targets for daily carbohydrate intake can be estimated using body mass (as a proxy for muscle volume) and exercise load.
- Daily carbohydrate intakes should match the fuel needs of training and glycogen restoration.
- Carbohydrate intake should remain flexible, as an athlete’s needs are not static; allow for variation in carbohydrate intake depending upon changes in daily, weekly, or seasonal goals, and training periodization.

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THE LUNGE—REDEFINING FORM FOR FEMALES

NICK TUMMINELLO

The job of the personal trainer is not only to personalize exercise prescription, but also to optimize the application of the exercises they prescribe. Doing so begins with a focus on both the safety of a given exercise and how well a given exercise will help the client or athlete achieve their desired training goals. There is no such thing as “man” exercises and “woman” exercises; there are just “exercises.” However, due to physiological differences between men and women, certain adjustments can be made in order to make them more “gender-specific.” Additionally, both genders tend to center their aesthetics-focused exercises on specific areas, and the personal trainer needs to recognize this, and program accordingly.

As the title indicates, this article will redefine lunge form for women that allows for increased hamstring and glute muscle strength and development than the traditional lunge form. In addition to providing a smarter way for females to perform basic lunges, this article will also show two lunge variations that are especially great for women. Please note that although this article focuses on women, males can certainly benefit from performing the exercise applications featured in this article.

THE LUNGE AND TORSO POSITION

In 2008, the Journal of Orthopaedic and Sports Physical Therapy published a study which showed that performing lunges with a forward (anterior) trunk lean can increase the recruitment of the hip extensors (i.e., glutes and hamstrings) (1). In contrast, the researchers found that forward lunges with extended trunk posture did not affect activation of musculature in the lower

extremity (1). In other words, having the torso positioned in a more forward lean instead of an upright position will help to focus more specifically on the glutes and hamstrings.

While there is nothing wrong with performing lunges with the torso fully upright, the upright posture will utilize more of the quadriceps musculature. However, here is where the gender-specific part comes in: the average woman does not typically require as much quadriceps-focused exercise as men.

In 2007, the Journal of Strength and Conditioning Research published a study that observed single-leg squats and found that men generally activate their hamstrings more efficiently than women (2). These findings are very important because women are 2 – 8 times more likely to experience ACL tears than men (3,4). Research focused on the possible reasons for this increased tendency of sustaining ACL injury suggests that an increase in quadriceps activation can lead to the knees experiencing excessive anterior tibial shear forces (5).

When compared to their quadriceps, most women exhibit significantly weaker hamstring muscles during single-leg squats (6). The Hunt Valley Consensus Conference on ACL injuries deduced that during eccentric contraction, quadriceps activation is a major factor in ACL injury (7). Both low back pain and injuries of the lower extremities have been associated with strength imbalances of the hip extensors in women as well (8).

MODIFIED LUNGE FORM

The research suggests that emphasizing the glutes and hamstrings relative to the quadriceps femoris can be beneficial for many women while performing exercise (2,3,4,5,6,7). This has important implications for the lunge and its variations, where performance can be modified to enhance activation of the hip extensors.

Figures 1 and 2 shows the traditional lunge with a 45-degree forward torso angle. The slight forward lean not only helps to reduce forces that occur at the knee joint, but it also places a greater emphasis on the glutes and hamstrings to carry out work. As discussed, this is particularly important for women given the predisposition to imbalance between the flexors and extensors of the hip and knee. This forward torso position can also be utilized while performing walking lunges or reverse lunges in order to achieve comparable results.



FIGURE 1. TRADITIONAL LUNGE WITH FORWARD LEAN – START



FIGURE 2. TRADITIONAL LUNGE WITH FORWARD LEAN – END

In addition to the lunge and its variations, the forward torso position also can be applied to the performance of the Bulgarian split squat. This exercise is an excellent alternative and/or complement to the lunge to help build stronger and better-looking glutes and thighs. Figures 3 and 4 depict the Bulgarian split squat with forward trunk lean.



FIGURE 3. BULGARIAN SPLIT SQUAT WITH FORWARD LEAN – START



FIGURE 4. BULGARIAN SPLIT SQUAT WITH FORWARD LEAN – END

THE LUNGE—REDEFINING FORM FOR FEMALES

Finally, Figures 5 and 6 depict an even more hamstring-dominant, single-leg exercise, the anterior leaning lunge. This exercise can be thought of as a hybrid between a lunge and a single-leg Romanian deadlift. Table 1 describes how to perform each of the three exercises.



FIGURE 5. ANTERIOR LEANING LUNGE – START



FIGURE 6. ANTERIOR LEANING LUNGE – END

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TABLE 1. EXERCISE DESCRIPTIONS

EXERCISE	SETUP	EXECUTION
Traditional Lunge with Forward Lean	Stand upright while holding dumbbells at the sides, with the feet hip-width apart.	Step back with the right foot. While positioning the body into the lunge stance, angle the torso forward to about 45 degrees so that the shoulders are over the front (left) knee and the dumbbells are on each side of the (left) calf. Be sure not to angle too far forward. Make sure that the back stays straight and is not rounded, and hinge at the hips to produce the torso lean. The left ribs should touch the left thigh and the right knee should slightly touch the floor in the end position. To return to the starting position, come out of the lunge and bring the right foot forward. Repeat the movement for the opposite leg.
Bulgarian Split Squat with Forward Lean	Stand upright while holding the arms or dumbbells by the sides. Place the left foot on top of a bench or chair in a split squat stance.	Lower the body toward the floor without allowing the back knee to rest on the floor. While lowering the body, keep the back straight and lean the torso slightly forward at roughly a 45-degree angle. Drive the heel into the ground to raise the body to the starting position to complete one repetition. Perform all repetitions on one side before switching to the other leg.
Anterior Leaning Lunge	Stand upright while holding dumbbells at the sides and keep the feet apart at hip-width.	With the front knee bent at 15 – 20 degrees and the back knee straight (or slightly bent), step forward with the front leg. Lean forward and hinge the hips to lift the rear heel off the ground. The torso should be no further than parallel to the floor and the back should be straight. Step backward to return to an upright starting position. Repeat the movement for the opposite leg. Do not let the dumbbells touch the floor at any point during this exercise.

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