Health Screening and Updated Blood Pressure Guidelines and Their Application for the Certified Personal Trainer

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ABSTRACT

Certified National Strength and Conditioning Association personal trainers are "health/fitness professionals who, using an individualized approach, assess, motivate, educate, and train clients regarding their health and fitness needs. They design safe and effective exercise programs, provide the guidance to help clients achieve their personal health/fitness goals, and respond appropriately in emergency situations. Recognizing their area of expertise, personal trainers refer clients to other health care professionals when appropriate." The design of safe and effective exercise programs includes the need to stay current with published research and changes to relevant exercise guidelines. The purpose of this article is to provide a brief overview of recent changes to the exercise preparticipation health screen, application of the physical activity readiness questionnaire for everyone (PAR-Q+), updated blood pressure guidelines, and recommendations for program design given these changes.

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AMERICAN COLLEGE OF SPORTS MEDICINE'S EXERCISE PREPARTICIPATION HEALTH SCREENING RECOMMENDATIONS

National Strength and Conditioning Association (NSCA)-certified personal trainers are advised to conduct both an initial health screen and an initial assessment with their clients before designing a personalized exercise program. Assessments and screens are differentiated in that an assessment "is the act of measuring a specific component of exercise and interpreting the results." The data collected from these results provide

- a baseline for future comparisons of improvement or rate of progress;
- identification of current strengths and weaknesses;
- assistance in establishing appropriate intensities and volumes of exercise;
- assistance in clarification of short-term, intermediate-term, and long-term goals;
- identification of areas of potential injury or contraindications before program initiation, which may lead to referral to a physician or other health care professionals; and
- a record demonstrating prudent judgment and appropriate scope of practice in program design should client injuries develop after a program has begun (2).

Whereas the purpose of an initial health screen is to "identify individuals who may be at elevated risk for exercise-related sudden cardiac death and/or acute myocardial infarction." (7).

In June 2016, the American College of Sports Medicine (ACSM) published their new preparticipation health screening recommendations (7). Before the changes, recommendations included health screening for known diseases, signs and symptoms suggestive of disease, and cardiovascular risk factors. This information was used to classify individuals into low-risk, moderate-risk, and high-risk categories. These classifications then led to recommendations on medical clearance or evaluation and/or exercise testing

KEY WORDS:
hypertension; blood pressure; health screening; PAR-Q; certified personal trainer; guidelines; physical activity; exercise; signs or symptoms

before clearing the individual for exercise. Studies indicated that this led to excessive physician referrals and created both a burden on the medical system and potential barriers to exercise, resulting in the new screening recommendations.

The new preparticipation health screening process no longer includes risk factor analysis resulting in eliminating risk-level classifications. Instead, it makes recommendations for physician clearance as opposed to specific recommendations for medical clearance or exercise testing.

Physician clearance is based on

- the individual's current level of structured exercise,
- the presence of major signs and symptoms suggestive of cardiovascular (CV), metabolic, or renal disease (Table 1), and
- the desired intensity of exercise.

The first step in this screening process is to determine whether the individual currently engages in structured exercise, and if so, to what level of intensity. The reasoning behind this is because individuals who engage in exercise are at lower risk of cardiovascular events in general, during exercise and immediately postexercise, as compared with nonexercising individuals.

The next step is to determine the recognition of CV, metabolic, or renal disease and the presence of major signs and symptoms suggestive of these diseases. During the screening process, the trainer should ask the individual whether a physician has ever diagnosed them with any of these conditions. Hypertension should be considered a cardiovascular disease risk factor and not a cardiac disease. Finally, medical clearance is determined based on the ACSM algorithm (Table 2) (Supplemental Digital Content 1, http://links.lww.com/FIT/A31).

National Strength and Conditioning Association–certified personal trainers are reminded that the purpose of this screening algorithm is to

- identify nonexercising individuals who are at risk for exercise-related CV complications or events and should receive medical clearance before beginning an exercise program,
- identify currently exercising individuals at risk for exercise-related CV complications or events who should receive medical clearance before increasing the frequency, volume, and/or intensity of their current program, and
- identify individuals with clinically significant disease(s) who may benefit from engaging in a medically supervised program or those with medical conditions who may require exclusion from exercise programs until those conditions are abated or better controlled.

Current exercisers are defined as those who have a history of performing planned, structured physical activity of at least moderate intensity for at least 30 minutes, a minimum of 3 times per week, for the past 3 months.

In addition to the screening algorithm, the new guidelines include an exercise preparticipation checklist which includes 3 easy-to-follow steps that instruct the fitness trainer how to proceed with the client. A helpful figure, created by Magal et al., can be found at doi: 10.1249/FIT.0000000000000202 (7).

It is important to note that desired exercise intensity is the final component of the screening algorithm. Because vigorous exercise increases the risk of triggering CV events, the trainer should identify the intensity of initial exercise. To that end, a common sense recommendation to reduce overall risk is to incorporate a progressive "transitional phase." This phase, also known as the initial program design, lasting about 2 months, includes the following:

- appropriate warm-ups and cooldowns,
- begins with light intensity through the use of rating of perceived exertion (RPE) scales, and

Table 1
Major signs or symptoms suggestive of cardiovascular, metabolic, and renal disease (7)

1. Pain or discomfort in the chest, neck, jaw, arms, or other areas
2. Shortness of breath (dyspnea) at rest or with mild exertion
3. Dizziness or syncope (loss of consciousness)
4. Orthopnea (shortness of breath at rest in a recumbent position, relieved by sitting upright or standing) or paroxysmal nocturnal dyspnea (shortness of breath that wakes the individual, beginning 2–5 h after the onset of sleep, relieved by sitting or standing)
5. Ankle edema (swelling caused by excess fluid trapped in tissues)
6. Heart palpitations or tachycardia
7. Intermittent claudication (pain in the lower extremities with inadequate blood supply brought on by exercise, but not with sitting or standing)
8. Known heart murmur
9. Unusual fatigue or shortness of breath with usual activities

Table 2
Components of the ACSM health screening algorithm (7)

Nonexercising individuals	Exercising individuals
1. Apparently healthy participants who have no history or signs or symptoms of CV, metabolic, or renal disease can immediately, and without medical clearance, initiate an exercise program at light-to-moderate intensity. Progression beyond moderate intensity should follow ACSM and NSCA guidelines for healthy individuals.	1. Participants who have no history or signs or symptoms of CV, metabolic, or renal disease may continue with their current exercise volume/intensity or progress as appropriate without medical clearance.
2. Participants who have known CV, metabolic, or renal disease and are asymptomatic should obtain medical clearance before initiating a structured exercise program of any intensity. After medical clearance, the individual may engage in light-intensity to moderate-intensity exercise and progress as tolerated following ACSM and NSCA guidelines.	2. Participants who have a known history of CV, metabolic, or renal disease, but have no current signs or symptoms (i.e., are clinically "stable"), may continue with moderate-intensity exercise without medical clearance. However, if these individuals desire to progress to vigorous-intensity aerobic exercise, medical clearance is recommended.
3. Symptomatic participants who do not currently exercise should seek medical clearance regardless of disease status. If signs or symptoms are present with activities of daily living, medical clearance may be urgent. After medical clearance, the individual may engage in light-intensity to moderate-intensity exercise and progress as tolerated following ACSM and NSCA guidelines.	3. Participants who experience signs or symptoms suggestive of CV, metabolic, or renal disease (regardless of disease status) should discontinue exercise and obtain medical clearance before continuing exercise at any intensity.

ACSM = American College of Sports Medicine; CV = cardiovascular; NSCA = National Strength and Conditioning Association.

- progresses in small, tolerable increments to moderate intensity, based heavily on regular client feedback.

Clients should also be familiar with the warning signs and symptoms of cardiovascular disease and avoid unaccustomed vigorous to near maximal exercise, which follows the recommendation to "start low, go slow" (7).

It should also be noted that in the new exercise preparticipation health screening procedures, individuals with pulmonary disease are no longer automatically referred for medical clearance because pulmonary disease does not increase the risks of nonfatal or fatal CV complications during or immediately after exercise.

PHYSICAL ACTIVITY READINESS QUESTIONNAIRE FOR EVERYONE

Closely related to the ACSM exercise preparticipation health screen is the PAR-Q+. The PAR-Q+ is a self-guided screening method that can be used as a supplemental tool for fitness trainers working with general, nonclinical populations who may want information above and beyond the new screening algorithm. It includes 7 questions (Table 3) and was developed to reduce barriers to exercise and false-positive screenings. Previous versions of the PAR-Q, such as the PAR-Q and YOU, relied heavily on risk factor profiling much like the preparticipation health screening algorithm but is no longer part of the screening process. The new PAR-Q+ includes additional questions which help guide preparticipation recommendations. These questions are used to identify pre-existing medical conditions that an increase in physical activity might aggravate. Another key aspect of the PAR-Q+ is that it can (and should) be used as an icebreaker during the initial consultation to establish the initial health assessment.

Answers to the above questions will help determine an individual's readiness to engage in exercise or progress their current program. Answering no to all 7 questions allows for reasonable assurance that they have a low risk of any complications from a low-to-moderate exercise program. Answering yes to any question suggests a need to consult with a physician before engaging in exercise.

When medical clearance is warranted for an individual, the personal trainer should refer them to a physician or a health care provider. It is then the responsibility of the provider to whom the individual was referred to use their discretion and clinical judgment in determining the type of medical clearance used.

Link to 2021 PAR-Q+: http://eparmedx.com/wp-content/uploads/2021/01/ParQ-Plus-Jan-2021-Fillable.pdf.

LIABILITY

Health screenings are recommendations that trainers should use with every potential client to help protect personal liability. Liability can be reduced if a client fails to disclose a particular condition and experiences

Table 3 PAR-Q + questions to identify pre-existing health conditions
1. Has your doctor ever said that you have a heart condition and that you should only perform physical activity recommended by a doctor?
2. Do you feel pain in your chest when you perform physical activity?
3. In the past month, have you had chest pain when you were not performing any physical activity?
4. Do you lose your balance because of dizziness, or do you ever lose consciousness?
5. Do you have a bone or joint problem that could be made worse by a change in your physical activity?
6. Is your doctor currently prescribing any medication for your blood pressure or a heart condition?
7. Do you know of any other reason why you should not engage in physical activity?

an issue during a training session. Conversely, if the trainer fails to use the PAR-Q+ with a client and they experience an issue, the trainer could be held liable for not conducting a proper screening before placing them on an exercise program.

UPDATE TO BLOOD PRESSURE GUIDELINES

Blood pressure (BP) is defined as the pressure of circulating blood against the walls of blood vessels and is expressed as systolic (the upper number) and diastolic (the lower number) pressure. Systolic BP (SBP) is the maximum pressure that occurs during one heartbeat, and diastolic BP (DBP) is the minimum pressure between 2 heartbeats. Along with body temperature, pulse, and respiratory rate, it is considered one of the most important vital, or medical, signs that indicate the status of the body's life-sustaining functions. Therefore, personal trainers should be aware of the BP status of their clients, especially if the client has been diagnosed as hypertensive.

The BP response to exercise varies between the type (e.g., aerobic vs. resistance training) and its intensity. During aerobic exercise, as the intensity increases, a corresponding increase in heart rate and SBP normally occurs, whereas DBP usually remains constant or slightly decreases. A rise in SBP during aerobic exercise between 140 and 220 mm Hg is considered normal (3,8). During resistance exercise, sharp increases in both SBP and DBP occur, the magnitude of which is dependent on the muscle groups involved and the intensity of the set. Values above 300 mm Hg SBP and above 200 mm Hg DBP are not uncommon, but in normotensive individuals, pressure will quickly drop to safe levels during rest periods between sets.

The increase in BP during exercise underscores the need for personal trainers to be cognizant of their client's resting BP (RBP) and aware of related exercise contraindications. Furthermore, updates to BP guidelines resulting in a lower blood pressure threshold mean that a larger percentage of the population–nearly half of U.S. adults–are now categorized as hypertensive.

THE GUIDELINES

The Joint National Commission (JNC), a U.S. government agency, began issuing BP guidelines in 1977. Guidelines were periodically updated until 2003 followed by a period of no change. In 2013, the National Institutes of Health transferred the responsibility of updating BP guidelines to the American College of Cardiology (ACC) and the American Heart Association (AHA). In 2017, the ACC and AHA released hypertension guidelines (4), replacing the previously established JNC guidelines (4) and included several updates (Table 4). The most significant of these changes include the following:

- "Normal" is now defined as SBP below 120 mm Hg and DBP below 80 mm Hg.
- The "prehypertensive" category has been reidentified as "elevated".
- Stage 1 hypertension is now defined as a SBP between 130 and 139 mm Hg and/or a DBP between 80 and 89 mm Hg.
- Stage 2 hypertension is now defined as a SBP of at least 140 mm Hg and/or a DBP of at least 90 mm Hg.

It should be noted that 2 well-respected medical organizations, the American Academy of Family Physicians (i.e., family medicine) and the American College of Physicians (i.e., internal medicine), have not adopted these new guidelines, opting to continue with the 2014 JNC guidelines (JNC 8). Their reasoning includes the following:

- BP is a dynamic (as opposed to static) measurement and varies based on when, where, and how it is measured.
- 12- to 24-hour ambulatory or home BP monitoring provides the best guidance.
- In the 2 largest trials used by the ACC/AHA leading to their change in guidelines, persons at high risk of cardiovascular disease had no statistically significant benefit related to all-cause mortality, CVD mortality, heart failure, or renal events when the lower BP cutoff was used.
- They believe it is an overreach to take the results of existing trial data and label everyone who has a BP above 130/80 mm Hg as having uncontrolled hypertension, particularly when that label will be applied based

Table 4 New 2017 ACC/AHA BP guidelines (6)			
		2014 JNC 8 BP guidelines (4)	
Normal	SBP less than 120 mm Hg DBP less than 80 mm Hg	Normal	SBP less than 120 mm Hg and DBP less than 80 mm Hg
Elevated	SBP 120–129 mm Hg and DBP less than 80 mm Hg	Prehypertension	SBP 120–139 mm Hg or DBP 80–89 mm Hg
Stage 1 hypertension	SBP 130–139 mm Hg or DBP 80–89 mm Hg	Stage 1 hypertension	SBP 140–159 mm Hg or DBP 90–99 mm Hg
Stage 2 hypertension	SBP 140 mm Hg or higher or DBP 90 mm Hg or higher	Stage 2 hypertension	SBP ≥ 160 mm Hg or DBP ≥ 100 mm Hg
Hypertensive crisis	Higher than 180 mm Hg and/or higher than 120 mm Hg		

ACC = American College of Cardiology; AHA = American Heart Association; BP = blood pressure; JNC = Joint National Commission; SBP = systolic blood pressure; DBP = diastolic blood pressure.

on the most recent routine office BP measurement.

- They believe significant harm will come if this change is widely accepted and implemented (6).

While personal trainers should be aware of the changes, they do not affect the ACSM's recommendations for medical intervention or exercise testing. In February 2021, the ACSM released the latest (11th) edition of the Guidelines for Exercise Testing and Prescription (GETP11) (1). Hypertension diagnosis does not suggest a need for clinical exercise testing if the individual is asymptomatic and there is adequate BP management. These individuals can engage in light-to-moderate aerobic exercise and/or a moderate, graded resistance exercise program. Individuals whose BP is not controlled (i.e., SBP ≥140 and/or DBP ≥90) should consult with their physician before engaging in an exercise program.

The ACSM GETP11 continues to define stage 2 hypertension in line with the 2014 JNC 8 guidelines–SBP ≥160 and/or DBP ≥100–as opposed to the new ACC/AHA changes and recommends that these individuals not engage in any exercise, including exercise testing, before a medical evaluation and adequate blood pressure management. Of note, the ACSM acknowledges that there is conflict between the 2 agencies' criteria and has chosen the less conservative of the 2 in their recommendations.

WHAT DOES THIS MEAN?

Personal trainers who work with clients outside of an acute, clinical setting (e.g., cardiac rehabilitation) should use the PAR-Q+ and initial consultation to determine whether an individual is hypertensive. If the individual's BP has not been checked recently (e.g., within 6 months), it would be prudent for the trainer to check their BP according to ACSM and AHA suggested protocols, which can include an electronic blood pressure monitor or to have BP checked by a medical professional to confirm current status. If RBP is 160/90 or above, the client must receive medical clearance before engaging in exercise. If the client is hypertensive but their BP is below 160/90, the trainer is instructed to use the ACSM's new preparticipation health screening algorithm and PAR-Q+ (see next sections) to determine exercise participation.

Personal trainers working with clients identified as having controlled hypertension should consider checking their resting BP before beginning at least the first few sessions. This will help establish that their blood pressure has adequate medical control. Trainers should always ask the "Readiness to Train" questions (Table 5) before every session as well and ensure that clients are taken through a graded, dynamic warm-up before their workout. Once it has been established that clients' RBP is in the safe range and they

Table 5 Readiness to train questions before each session
1. How do you feel today?
2. How did your body respond to the last exercise session?
3. When and what did you last eat and drink?
4. Have you taken your medications?
5. Are you on any new medications?
6. Did you check your blood sugar (if applicable)?
7. Is there anything else you would like me to know before the workout session?

regularly take their medications, checking BP before sessions can occur occasionally, at the discretion of the trainer and client.

CONCLUSION AND PRACTICAL APPLICATION

The initial screening process and consultation are the first steps in designing safe, progressive exercise programs for clients. Personal trainers are expected to remain current with guidelines and relevant updates.

Despite recent, more conservative changes in BP guidelines by the ACC/AHA, the ACSM has opted to make note of the changes in the recent release of their Guidelines for Exercise Testing and Prescription while sticking with the JNC's criteria relating to the need for exercise testing and physician clearance for exercise. Therefore, the personal trainer should be aware of both agencies' recommendations and understand that a reason for the more conservative guidelines is to allow for earlier lifestyle counseling with patients but use the JNC criteria as the guide related to exercise.

Personal trainers who work with the general population outside of an acute, clinical setting are instructed to use both the new preparticipation health screening algorithm and the PAR-Q+ to begin the screening process and initiate discussion, before performing the initial assessment and the design of an exercise program. The algorithm and PAR-Q+ are designed to make the process easier for personal trainers to understand when clients can exercise safely without the need for physician clearance versus when clients should first be referred to a provider.

To increase safety and decrease the risk of any negative events, the design of programs should always include a "transitional phase," where initial frequency, volume, and intensity are reduced. The use of RPE scales and regular client feedback should be used to determine comfortable start points for both aerobic and resistance exercise training. Once it has been established that the program is well-tolerated, progression in small, tolerable increments can also be guided by the use of RPE scales and client feedback, that is, "start low, progress slow."

Hypertensive clients should have their BP checked, using ACSM and AHA protocols, before and immediately after training sessions. This procedure only needs to occur often enough to establish that the clients are taking their prescribed medications and their RBP is within safe limits. Once this has been established, the frequency of BP readings before training is at the discretion of the trainer and client.

Personal trainers should also include the 'Readiness to Train' questions at the start of every session and adjust accordingly based on answers to these questions. Adjustments may include reduced volume and/or intensity, increased rest periods between sets, or changes in exercise selection. Hydration and client feedback during the session (e.g., "How did that set feel?" or "How are you feeling?") are additional safety measures that should be used.

By habitually incorporating these protocols, the risk of a negative event during training sessions is reduced, and clients can be progressed safely. In addition, a safe client is a happy client.

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REFERENCES

1. American College of Sports Medicine, Liguori G. *ACSM's Guidelines for Exercise Testing and Prescription* (11th ed). Philadelphia, PA: Wolters Kluwer, 2021.
2. Coburn JW, Malek MH; National Strength & Conditioning Association (U.S.). *NSCA's Essentials of Personal Training*. Champaign, IL: Human Kinetics, 2012.
3. Daida H, Allison TG, Squires RW, Miller TD, Gau GT. Peak exercise blood pressure stratified by age and gender in apparently healthy subjects. *Mayo Clinic Proc* 71: 445–452, 1996.
4. de la Sierra A. New American and European hypertension guidelines, reconciling the differences. *Cardiol Ther* 8: 157–166, 2019.
5. Kompf J. The scope of practice for the personal trainer. *NSCA Personal Trainer Q* 1: 4–8, 2014.
6. LeFevre M. ACC/AHA hypertension guideline: What is new? What do we do? *Am Fam Physician* 97: 372–373, 2018.
7. Magal M, Riebe D. New preparticipation health screening recommendations. *ACSM's Health Fitness J* 20: 22–27, 2016.
8. Vy-Van Le, Mitiku T, Sungar G, Myers J, Froelicher V. The blood pressure response to dynamic exercise testing: A systematic review. *Prog Cardiovasc Dis* 51: 135–160, 2008.