BY JEFFREY M. JANOT, PHD

Made to "FITT"

Use frequency, intensity, time and type (FITT) of exercise to master the art and science of cardiorespiratory fitness program design.

Personal fitness trainers (PFTs) draw from a distinct body of scientific knowledge to create appropriate and individualized cardiorespiratory exercise programs for clients. A great amount of research has been done on heart rate zone training, optimal frequency and time of exercise, exercise progression, and the effects of these factors on caloric expenditure during exercise.

If the "science" of exercise program design is black-and-white, then the "art" is the gray area.

Science cannot provide answers to cover all situations. Hasn't there been a time when you changed a client's program partially based on a subjective or "gut" feeling? Knowing instinctively what to do in these situations illustrates the "art" of exercise program design. While the art of great program design can be difficult to teach or learn, it becomes more natural with experience.

IN THE BEGINNING . . .

The fundamental objective of exercise program design is to promote long-term exercise adherence and help clients attain their goals (ACSM 2000; Heyward 2002). Before beginning any type of exercise program, each client should set realistic and measurable goals.

Begin your discussion of goals with questions regarding the client's favorite activities, the amount of time she is willing to set aside for the exercise program, her past exercise history and her social support. Often, this discussion will lead to the creation of goals. Also take time in this initial meeting to discuss safe exercise practices such as hydration, proper clothing, heat and cold, and injury prevention.

EXERCISE PROGRAM COMPONENTS

The basic components of the cardiorespiratory exercise program are the warm-up phase (5–10 minutes), the cardiorespiratory endurance phase (15–45 minutes) and the cooldown phase (5–10 minutes). You may also elect to include a "recreational phase" outside of the traditional exercise session to provide more variety and creativity. Activities for this phase might include basketball, racquetball, tennis or other sports/games.

Warm-Up and Cooldown

The objective of an effective warm-up is to better facilitate the transition from rest to the endurance phase of the exercise session. The activity you choose for the warm-up need not be similar to what the client will do during the endurance phase, although making it similar may speed up the transition from rest to exercise. The main goals are to maximize muscular performance and joint range of motion by increasing blood flow—and, thus, oxygen delivery—to the muscles; to raise muscle temperature; and to increase metabolic rate. The warm-up intensity should be low and can be progressive, with the endpoint being the intensity the client will use during the endurance phase.

The objective of the cooldown phase is to allow for the appropriate adjustment and recovery of heart rate and blood pressure and the dissipation of heat following exercise. Omission of an appropriate post-exercise cooldown can lead to an increased incidence of cardiovascular complications, such as chest pain (angina) or a drop in blood pressure (hypotension). Blood flow back to the heart from the lower extremities is facilitated by the contraction of the leg muscles (also known as the "skeletal muscle pump"). If an exerciser were to stop contracting his muscles following exercise, blood flow back to his heart would begin to slow, causing a decreased flow to his brain and heart muscle. This could increase the risk of dizziness, fainting and angina and could lead to serious complications requiring medical attention. Many activities can serve as the cooldown, but you should choose based on the exercises you included in the cardiorespiratory or recreational phase.

The FITT Principle

Frequency. The optimal range for exercise frequency is 3–5 days per week (ACSM 2000; Howley & Franks 2003). Setting frequency below this range may not be enough to produce an

effective stimulus to improve fitness; setting frequency over this range may elicit minimal benefits at a higher risk of injury. To some extent, frequency is inversely related to intensity. For example, if you have a client perform lower-intensity exercise, she will need to exercise more frequently throughout the week, and vice versa.

Intensity is the most important factor affecting increases in cardiorespiratory fitness throughout an exercise program, but it can also lead to a higher risk of injury if intensity is too high (ACSM 2000; Heyward 2002). The optimal intensity range can be determined by a number of methods: %HRmax, %HRreserve, %VO_2max, %VO_2reserve, talk test and RPE, to name a few. Following are ranges for exercise intensity:

- %HRmax: (55%–65%) – 90%
- %HRreserve: (40%–50%) – 85%
- %VO_2max or %VO_2reserve: (40%–50%) – 85%
- RPE: 12–16 on the 6–20 Borg scale
- talk test: point of being able to hold a conversation while exercising, but not being out of breath

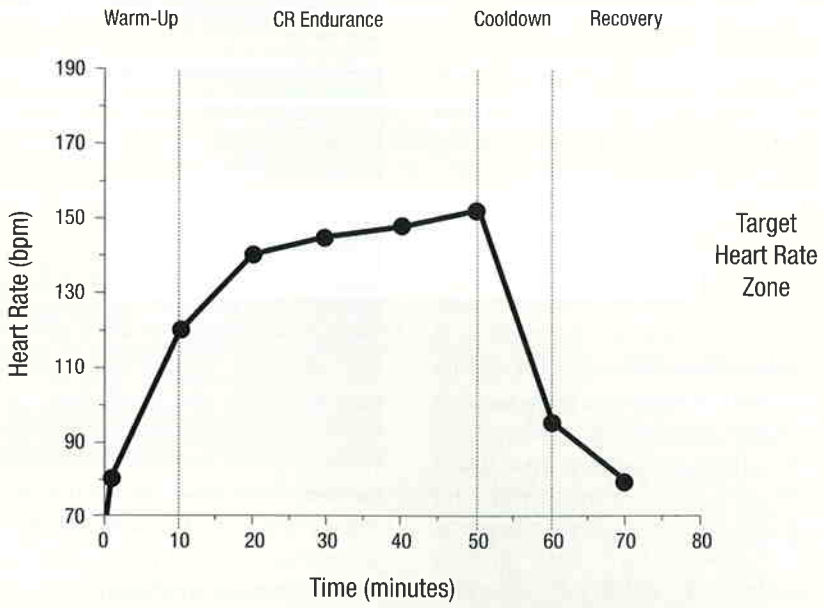
The first three methods have an initial starting range, which you can give to new exercisers, and a top range, useful for more experienced clients. The next PFT 101 column will cover a thorough discussion and comparison of these methods.

Time (or Duration). The optimal range for exercise time is 20–60 minutes (ACSM 2000; Howley & Franks 2003). Time is inversely related to intensity, much as frequency is; increasing time along with intensity will greatly affect caloric expenditure during exercise. However, in the initial stages of a client's exercise program, you should increase time more than intensity to lower the risk of injury and increase adherence.

Type. In general, the exercise modes or activities that will elicit the greatest increase in VO_2max are those that involve large muscle groups, are rhythmic and aerobic in nature, and can be kept up for a prolonged period of time (ACSM 2000). Examples are walking, cycling, running and cross-country skiing. These activities can also be grouped based on the skill needed and energy expended during performance (ACSM 2000):

- **Group 1 Activities.** These are "beginner" activities, recommended for sedentary or at-risk individuals. Constant intensity and energy expenditure

Figure 1. Heart rate response during warm-up, cardiorespiratory (CR) endurance phase, cooldown and recovery. The time this individual spends in her target heart rate zone is approximately 40 minutes of the exercise session.



Source: Adapted from ACSM's Guidelines for Exercise Testing and Prescription *(6th ed.) (Lippincott Williams & Wilkins 2000).*

table 1. frequency, intensity and time progression for apparently healthy clients

STAGE	WEEK	FREQUENCY (days/week)	INTENSITY (%HRmax)	TIME (minutes)
Initial	1	3	55%–65%	15–20
	2	3–4	55%–65%	20–25
	3	3–4	60%–70%	20–25
	4	3–4	60%–70%	25–30
Improvement	5–7	3–4	65%–75%	25–30
	8–10	3–4	65%–75%	30–35
	11–13	3–4	70%–80%	30–35
	14–16	3–5	70%–80%	30–35
	17–20	3–5	75%–90%	35–40
	21–24	4–5	75%–90%	35–45
Maintenance	24	4–5	75%–90%	35–45

can be controlled and maintained throughout the duration of the activity. Examples are walking and cycling.

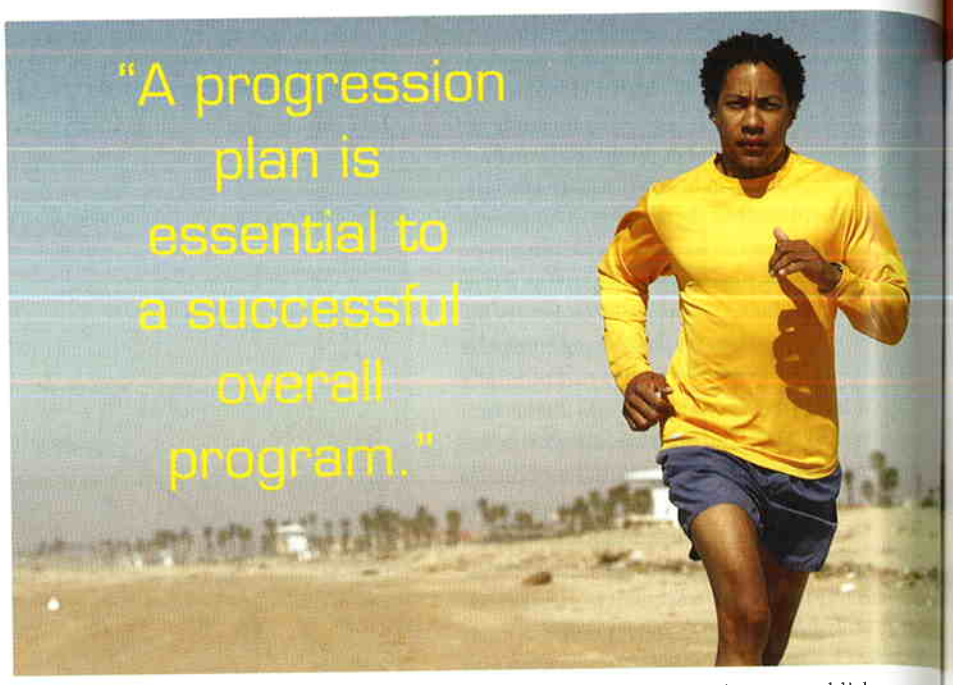
- **Group 2 Activities.** While these activities command a higher degree of skill than those in Group 1, they can still be used during the initial stages of a conditioning program. Thus, skill will be an important determinant of overall energy expenditure over the exercise's duration. Examples are swimming and cross-country skiing.
- **Group 3 Activities.** These activities do not necessarily demand high levels of skill and energy expenditure, but requirements may vary greatly throughout the duration of the exercise. A higher risk of injury is associated with these activities because of the variability in skill and intensity needed to perform them. Use caution when incorporating them into programs for sedentary, obese or other at-risk clients. These activities can be employed in the group exercise setting and used to provide program variety. Examples are basketball and racquet sports.

In general, choose type of exercise, mode or activity based on the client's goals and the aim of maximizing adherence to the program. Also consider your client's initial fitness level, exercise limitations (such as injuries or musculoskeletal problems), and time or equipment available to perform the activity.

EXERCISE PROGRAM PROGRESSION

To help your client continually improve his cardiorespiratory fitness, challenge his body with more work than it is used to doing. Do this by progressively increasing exercise frequency, intensity and time over the length of the training program. A number of factors will affect the rate at which you progress a client: (1) tolerance to exercise and initial fitness level prior to the program; (2) goals and exercise history; and (3) health status and age.

A progression plan is essential to a successful overall program. While the plan is not set in stone, it will provide a general framework your client can use in the weeks to follow. A very general guideline is to increase intensity by about 5% when the upper ranges of intensity become easy to perform, and to increase exercise volume (frequency multiplied by time) by about 10% each week. Change just one FITT component at a time as the client progresses. This will ensure adequate adaptation to the new change before you increase other areas.



There are three stages of progression in a cardiorespiratory fitness program: initial, improvement and maintenance (ACSM 2000; Heyward 2002):

1. **Initial Stage.** The goal of this stage is to prepare the client for a long-term exercise program. The phase typically lasts 4 weeks, depending on the rate of improvement. Exercise intensity should be moderate to minimize muscle soreness, discomfort and risk of injury. Increase time/duration to a goal of 30 minutes by the end of this stage. Exercise adherence is an important habit to establish, so program creatively as you increase duration, but de-emphasize intensity.
2. **Improvement Stage.** The goal of this stage is to provide a gradual increase in the exercise stimulus (mostly through intensity and time) to allow for continued improvements in cardiorespiratory fitness. This stage typically lasts 4–5 months depending on how fast the client adapts to the program and meets his goals. Deconditioned or older clients may need more time in this stage to reach their goals.
3. **Maintenance Stage.** The goal of this stage is to maintain the fitness gained in the improvement stage. Further improvements in fitness may be minimal if the exercise stimulus remains the same and all goals have been met. This may be an opportune time to establish loftier goals or embark on a more challenging training program.

Refer to Table 1 on page 35 for an example of a cardiorespiratory fitness program progression plan for an apparently healthy adult.

FINAL THOUGHTS

Bear in mind that the most important factor in exercise program design is intensity (followed by frequency and time) because intensity can have the greatest effect on program adherence and risk of injury. Striving for creativity and variety in your client's program also has far-reaching implications for program adherence. However, the bottom line for designing an appropriate exercise program and maximizing adherence is to continually keep your client's goals in mind and customize the program as much as possible. ■

Jeffrey M. Janot, PhD, is an assistant professor of exercise physiology in the department of health, physical education and recreation at South Dakota State University. He is the technical editor of IDEA Fitness Journal. *Contact him at jeffrey_janot@sdstate.edu.*

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