

YOGA and PILATES: Aligning Expectations with Reality

Research can be a helpful tool to sift through the facts and fiction surrounding these popular disciplines.

By John P. Porcari, Ph.D., Stefanie Spilde, B.S., Dawn Boehde, B.S., and Carl Foster, Ph.D.

YOGA AND PILATES were once looked upon as passing fitness trends, as many people were skeptical about taking a mind/body approach to fitness. However, both disciplines gained in popularity throughout the 1990s and participation has continued to grow by approximately 3 percent per year in the last decade.⁴ It has been estimated that at least 7 million adults participated in either yoga or Pilates in 2004.⁴ Many claims are made about the benefits of yoga and Pilates, including gains in strength, flexibility, aerobic capacity, balance, blood pressure, respiration rate and pulmonary function. As such, many health clubs and fitness facilities now offer a wide variety of yoga- or Pilates-based classes catering to specific populations.

Origin of yoga and Pilates

The beginnings of yoga are thought to be traced back to 2250 B.C. At that time, the Harrapan Civilization in Northern India developed postures, along with breath control techniques, in order to enter altered consciousness and achieve a state of calmness and unity.⁵ Yoga continued to evolve, gaining breadth as Buddhism and Jainism developed. By 200 A.D., yoga was accepted as one of six systems of Hindu philosophy, and the handing down of yogic knowledge became a continuing tradition. Since then, many types of yoga have developed, each varying slightly and rooted in varying philosophies and time periods. Controlled breathing (pranayamas) and postures (asanas) are the basis of all yogic practice. The different postures can be conducted in the supine, sitting or standing position, and are believed to tone the body while relaxing the mind.

The Pilates method, most often referred to as just "Pilates," is a total body conditioning program developed by Joseph Pilates in the early 1900s.⁷ It was used mainly in the training and rehabilitative programs of dancers. Pilates also involves a philosophy that incorporates the body, mind and spirit. The entire program is made up of more than 500 exercises performed on a mat or using equipment made exclusively for the practice of Pilates. One's own body is the

only resistance relied upon in Pilates. The Pilates method is thought to improve body mechanics, balance, coordination, strength and flexibility. Core strength and stability gains are the most touted benefits of a well-designed Pilates program.

Musculoskeletal benefits of yoga and Pilates

While the origins of yoga and Pilates focused on the mind/body connection, it is the physical aspects of the disciplines that often gain the most attention. With limited time to work out, people want to know what sort of benefits they can expect by participating in yoga or Pilates classes. There has been relatively little research on the training benefits of either discipline, but in those studies that have been conducted, there is general agreement on the musculoskeletal benefits that can be achieved. Improvements in flexibility, muscular strength and muscular endurance are routinely seen as a result of yoga training.⁶ A recent study in our laboratory found that following eight weeks of thrice weekly Hatha yoga training (50 minutes per session), sit and reach flexibility improved by 3 inches, trunk rotation improved by 25 degrees, shoulder flexibility improved by 1.5 inches, and trunk flexion and extension improved by 6 degrees and 9 degrees, respectively. Undoubtedly, improvements in these parameters were a direct result of the many

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bending, twisting and reaching postures that were incorporated into the training sessions. Additional benefits also included a 29 percent increase in the number of push-ups that could be performed and a 40 percent increase in the number of sit-ups completed. While push-ups and sit-

ups were not included in the training sessions, the isometric nature of many of the poses and the stabilization needed to hold the poses probably resulted in these improvements. Balance, as measured by a one-legged stand, also improved significantly, probably as a result of many postures carried out while balancing on one leg.

Very little research has been done on the specific training benefits of Pilates. Since Pilates is known for strengthening the "core," most studies that have been completed have looked at gains in muscular strength and endurance in the abdominal region. A study performed by Esco et al. tested five basic Pilates moves and found that there were greater improvements in abdominal strength when compared to traditional crunches.³



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Can yoga and Pilates be considered aerobic?

Despite the fact that yoga and Pilates were not originally designed to be aerobic in nature, many claims are made that they are. Programs such as yogaeobics and yopalates (a combination of yoga and Pilates) have been developed to incorporate an increased tempo and intensity of poses to be more aerobic.

Very few studies have been conducted that have actually shown an improvement in aerobic capacity following yoga training. In the abovementioned study conducted in our laboratory, we found no change in aerobic capacity. Those studies that have found an improvement typically used submaximal tests to predict changes in $VO_2\text{max}$. Submaximal tests, especially on a treadmill, are not an acceptable method to track aerobic capacity, since many times improvements are predicted from an increase in treadmill time. Improvements in muscular strength and endurance, common following yoga or Pilates training, often result in improvements in treadmill time to exhaustion, independent of changes in aerobic capacity. Thus, it would appear that aerobic capacity improved, when in actuality the benefit was purely musculoskeletal in nature.

The logical question becomes, "Why are there no changes or only minimal changes in aerobic capacity following yoga or Pilates training?" It boils down to training intensity. The American College of Sports Medicine states that to improve cardiorespiratory endurance, the intensity of exercise must be between 55 to 90 percent of maximal heart rate or 45 to 85 percent of $VO_2\text{max}$.¹ When looking at data from a number of studies, participants in a typical Hatha yoga class are not working at an intensity that gets them into a training zone. A study by Clay et al., as well as data from our laboratory, found that subjects' heart rates during Hatha yoga are in the range of 90 to 105 beats per minute (approximately 50 percent of maximal heart rate) and oxygen consumption values are in the range of 20 to 30 percent of $VO_2\text{max}$.² A beginner Pilates routine yielded similar results. Clearly, these values are below the minimal training threshold for the majority of people.

Quite obviously, both yoga and Pilates can be conducted at higher intensities (e.g., power yoga). In our laboratory, a power yoga session

elicited heart rate and oxygen consumption values corresponding to 62 percent of HRmax and 46 percent of $VO_2\text{max}$ and an advanced Pilates routine elicited intensities of 62 percent of HRmax and 43 percent of $VO_2\text{max}$, respectively. The intensity of both of these workouts was in the vicinity of the minimal training threshold recommended by the ACSM. However, it should be noted that heart rates were higher than would be expected relative to oxygen consumption values, indicating that heart rates may not be the best way to gauge the intensity of yoga and Pilates exercise. The high degree of muscular effort most likely elevated heart rate values, thus skewing the normal HR/ VO_2 relationship typically seen with purely aerobic type exercise.

Can participation in yoga and Pilates alter body composition?

A goal of many exercise participants is to lose weight and/or alter body composition. From a weight-loss perspective, the caloric expenditure during a Hatha yoga routine or a beginner Pilates session does not seem sufficient to have a measurable effect on body weight. Data from Clay et al., and from our laboratory, found that the energy cost of beginner yoga and Pilates workouts ranges from 2.2 to 3.6 kcal/min.² This is the equivalent of walking at only 2 mph.⁴ To put this in perspective, the average 140-pound person would have to walk for 19.5 hours to lose one pound of fat. In agreement with these findings, very few studies have seen changes in body weight following either yoga or Pilates training. More advanced forms of yoga and Pilates burn in the range of 5.5 to 6 kcal/min, which is the equivalent of a brisk (3.5 to 4 m.p.h.) walk. To our knowledge, there have not been any studies that have looked at the training effects consequent to more advanced forms of these disciplines.

Bottom line

Yoga and Pilates are excellent fitness activities and should be included as part of an overall fitness program. However, both disciplines are probably best suited for the purpose for which they were originally designed — is to improve flexibility, balance, muscular strength, muscular endurance and psychological well-being. They can be tailored to be more aerobic in nature. However, the more aerobic they become, the less effective they are going to be in improving the abovementioned parameters. If aerobic conditioning or positively altering body weight is the main goal of an individual's exercise program, more traditional exercise, such as walking or biking, may be more appropriate. **FM**

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John P. Porcari, Ph.D., and Carl Foster, Ph.D., are professors in the Department of Exercise and Sports Science, and Stefanie Spilde, B.S., and Dawn Boehde, B.S., are graduate students in the clinical exercise physiology program at the University of Wisconsin, La Crosse.