

# Considerations for Integrating Fitness into Dance Training

Sonia Rafferty, M.Sc.

## Abstract

In recent years it has frequently been suggested that dancers may not be sufficiently prepared for the physical demands of dance. The majority of researchers have arrived at the conclusion that there are gaps in the structure of dance training programs that could be filled with the type of physical training that has benefited other elite athletes. This article reviews some recommendations in light of current research for the supplementation of dance training and the inclusion of fitness concepts in traditional dance classes.

A significant amount of research over the past two decades has attempted to compare dancers to athletes. In particular, the extent of dancers' physical fitness has come under close scrutiny. It has been suggested that reduced levels of physical fitness are associated with relatively high levels of injuries in dancers and may hinder their ability to perform to maximum potential.<sup>1-4</sup> In contrast, there are concerns within the profession that a focus on "scientific," purely physiological rather than artistic elements may be detrimental to the art form; that physical work not directly related to dance could diminish dancers' aesthetic appeal,<sup>5</sup> and even work in opposition to the dance class. However, research in sport confirms

that fitness training can support the goals of the dance artist, including movement efficiency, injury prevention, performance excellence, and longevity in the field.<sup>6</sup>

Bompa states that in sports, techniques continuously evolve and the content of technical training never remains the same.<sup>7</sup> Similarly, the art of dance in all its forms is evolving. Technique and teaching styles are undergoing metamorphosis, and modern choreography is pushing the dancer into new realms of physical articulation and stamina. It is now an expectation, or at least a recommendation, in the professional arena that dancers be fit enough to cope with the increased physiological demands.<sup>8</sup> Technical training must attempt to reflect these innovations, and evolve at sufficient pace to serve the art form.<sup>9</sup> Happily, there is evidence of growing appreciation and recognition of the ability of dance science to support dance practice principles (relating to fitness, health, safe practice, teaching, and optimal performance),<sup>10,11</sup> even if its findings may not yet be consistently applied. The goal now is to find the most effective ways to integrate this knowledge into dance training.

Darby<sup>12</sup> discusses Chmelar and

Fitt's Dance Training Pyramid, which divides dance training into three areas, each of which has a specific goal: the technique class, somatics, and conditioning. The technique class concentrates on skill development, providing general strength, endurance, flexibility, alignment, coordination, and neural integration. Somatics includes body therapies, guided imagery, neural patterning, proprioception, and constructive rest. Conditioning concerns the elements of fitness and personal development. Researchers question the capacity of the traditional dance technique class to address all of these issues, and suggest either adaptations in structure and content to the class itself or separate supplementary sessions.

## The Components of Fitness and Exercise Training

The formal dance class has long been considered the cornerstone of training, providing all the technical, physical, and aesthetic requirements of dance.<sup>13</sup> However, studies have shown that performing dance in itself elicits only limited stimuli for positive fitness adaptations; professional dancers often demonstrate fitness values similar to those obtained from healthy sedentary individuals of comparable age.<sup>4,5</sup>

In a well-rounded training program it is necessary to consider *all* the components of fitness. These are

Sonia Rafferty, M.Sc., is at Laban, London, United Kingdom.

*Correspondence:* Sonia Rafferty, M.Sc., Laban, Creekside, Deptford, London SE8 3DZ, United Kingdom; s.rafferty@laban.org.

cardiovascular (respiratory) endurance, or aerobic fitness, associated with moderate, longer-term levels of activity, and anaerobic fitness, which involves maximal, short-term activity. Power is the explosive (speed-related) aspect of strength, which in turn is the ability to produce force. Flexibility is the mobility and range of motion of a joint. Neuromuscular coordination involves balance, coordination, and skill. Body composition relates to the make-up of body weight by percentage of muscle and fat.<sup>9,14</sup> Each component should be awarded equal importance (a common error made by dancers is to emphasize flexibility but neglect strength and other conditioning components).<sup>14,15</sup>

The following variables of exercise training also need to be understood in constructing balanced training plans. For performance improvement it is necessary to progress to a higher level of difficulty by increasing intensity, volume, and frequency over time; otherwise the body simply adapts to the training and fitness settles at a plateau.<sup>16</sup> Fundamental to training is the concept of overload, which holds that the body system must be challenged above a certain threshold to provide sufficient stimulus for improvement to occur. Normally encountered stress will maintain but not increase the level of conditioning; for example, if the day-to-day demands of a dance class are too similar, there will be insufficient overload for desired improvement to take place.<sup>9</sup> Important in the design of any training program is the specific manner in which the overload is applied: that is, to the same muscle groups, with the same type of contraction, at similar intensity and duration, and ideally at the similar joint angles and velocity.<sup>9</sup> Sports literature describing this principle of specificity recommends that in order to develop motor abilities the training exercise should use similar technical patterns and kinematic structure to the particular activity for which it is preparing the athlete,

including speeds, amplitudes, and loads.<sup>7</sup>

### **The Physiological Requirements for Dance and the Scope of the Technique Class**

The physiological demands of dance are considered to be high-intensity, intermittent, or interval in nature, involving both the aerobic and anaerobic energy production systems.<sup>1,17,18</sup> A significantly greater mean heart rate (HR) and maximal oxygen uptake (VO<sub>2</sub>max) have been observed in performance than in class or rehearsal, indicating that its intensity is higher.<sup>1,19</sup> This has led to questions regarding the effectiveness of the technique class and its role in the dancer's daily preparation and training for performance.

Ekert comments that the function of the technique class is to build pathways to enhance efficient movement and that it cannot realistically address *all* the components of fitness, but by highlighting one or two principles as needed the teacher should be able to develop limited and attainable conditioning goals.<sup>20</sup> Application of overload principles and pacing could also have positive effects.<sup>2</sup> While technique classes focus on neuromuscular coordination and exercises for muscular endurance and flexibility (although this varies from teacher to teacher), the length of a traditional class may not be adequate to meet all of the conditioning needs. The amount of space available, the numbers of students, and the time required for teaching and correcting also have an impact on work rate.

Therefore, in order to achieve efficient and optimal development of dance skills, conditioning work over and above daily technique class has been recommended.<sup>14,21-23</sup> Koutedakis states that regardless of performance level, talent, form of dance, gender, or age, all dancers have to use some or all of the elements of fitness during their daily practice.<sup>24</sup> It is important to remember that particular groupings of dancers may have varying abilities and physical knowledge, so care must be taken to construct safe and appropri-

ate regimens. For example, Berardi advises that adolescent dancers generally experience rapidly developing proprioception and coordination, which can affect their performance, especially in relation to strength training.<sup>25</sup>

Wyon suggests that for vocational dance students, who have slightly different training goals than professionals, fatigue can contribute to injury occurrence, so the emphasis should be on aerobic conditioning, but sessions should also include muscular strength, endurance, and power work.<sup>17</sup> He provides guidelines for the format of these sessions. General circuit training might be appropriate, using an intensity level between 60% and 85% of an individual's maximal oxygen uptake (VO<sub>2</sub>max), 70% and 90% of maximum heart rate (HRmax), or 14 to 17 continuous Rate of Perceived Exertion (RPE).<sup>26</sup> The duration of the training sessions should be between 20 and 40 minutes. Interval training is also recommended for the development of VO<sub>2</sub>max, utilizing an exercise-to-rest ratio of 1:1, with optimum exercise time for each bout of between three and six minutes. Intensity should be near maximal (RPE 16 to 17): 90% to 95% of VO<sub>2</sub>max, or 90% to 95% HRmax. The rest periods should actually involve low intensity exercise, as this promotes faster recovery. A periodized training plan for dancers that takes into account total training loads from all training formats—class, rehearsal, performance, and supplementary training—is advised.<sup>17</sup> Clarkson and Skrinar additionally recommend that to avoid a detraining effect (*reversibility* is a reduction in performance due to discontinuous overload), a workout frequency of one to two times per week for maintenance and three or more times per week for improvement is desirable.<sup>9</sup>

### **Aerobic and Endurance Training**

The greater a dancer's aerobic power, the lower the contribution of the anaerobic system at high intensity levels, allowing the dancer to work longer at lower heart rates before

becoming fatigued.<sup>19</sup> While dance activity itself can cause a moderate increase in aerobic power, greater benefits could be achieved if more emphasis were placed on cardiovascular training.<sup>18,27</sup> Technique classes could be modified to involve some degree of aerobic cardiovascular overload, using simple repetitive movements.<sup>19</sup> Some studies have found the warm-up phase of class to be conducted at too low an intensity to elicit a training effect,<sup>23</sup> while others affirm that the intermittent center phase of class also fails to place sufficient stress on the aerobic system.<sup>23,27-29</sup> Warm-up could be conducted in a continuous manner at a higher intensity, and center and travelling sequences could be longer, with less rest time, allowing an aerobic foundation to develop. Familiar movement combinations might be performed over consecutive classes, purely for the benefits of continuous repetition rather than artistic effect. Rafferty and colleagues observed an increase in student dancers' aerobic capabilities following a once per week dance-specific fitness program conducted over a one year period.<sup>30</sup> The dancers participated in continuous aerobic movement sequences, which increased in both intensity and duration (between 20 and 30 minutes) over time. Dance-specific movements were introduced gradually, but the goal was a positive physiological training effect emphasizing activity-specific exercises rather than movement skill accuracy.

### Strength and Power Training

The role of resistance training in dance has frequently been misunderstood. While research has shown that supplementary strength training has desirable effects on dancers, there are concerns that it will negatively affect flexibility and aesthetic appearance. There is little scientific evidence to support this view.<sup>4,6,14,31</sup> In fact, strength training may be particularly important, as it has been recommended as a means of increasing bone health and preventing osteoporosis in both female athletes and dancers.<sup>6</sup>

For an optimal strength training

program it has been suggested that the exercises should simulate the plane, direction, and specific angle in which the skill is performed. The advantage is that movement specificity allows peripheral adaptations to occur in the muscle fibers that are used in dance.<sup>6,17</sup> However, multilateral strength training is initially recommended so that all muscle groups are strengthened and developed for future heavy loads and subsequent specific training.<sup>7</sup> The recommended training frequency to increase strength is three evenly spaced sessions, but to maintain these gains one session of resistance training per week is adequate.<sup>14</sup> Franklin prefers the use of a Thera-Band<sup>®</sup> for strengthening and advises that for greatest benefit exercises should be used that target the muscles to be strengthened employing the coordination that will be required to perform them optimally: speed, specificity of muscle group, and specificity of muscle action.<sup>32</sup>

Jumping is an integral part of most dance performances, involving the use of both muscular strength and elasticity. Studies report that plyometric (jump) training has been shown to have a positive effect on power-related variables in dancers<sup>3,33</sup>; however, there are warnings that plyometric training must be approached gradually and systematically to avoid injury.<sup>14</sup> Harley and associates observed that dancers learn to jump in a rigidly controlled manner to serve the aesthetic, maintaining strict alignments between sections of the body that could result in restriction of movements that aid elevation.<sup>33</sup> These investigators recommend that dance teachers and conditioning specialists address this issue. Perhaps classes could be designed in which dancers are encouraged to jump without emphasizing correct technique but rather focus on jumping higher. Once the dancers have gained greater understanding of how to elevate themselves they could bring correct dance technique back into the movements while trying to maintain as much height as possible.

By adapting original research on jump training for female athletes (Hewett and colleagues<sup>34-36</sup>) the

Harkness Center for Dance Injuries has developed guidelines for the implementation of a safe and effective dance-specific plyometric training program.

### Somatics, Motor Learning, and Psychology in Dance Training

Research in the fields of somatics, motor learning, and psychology provides alternative viewpoints on the construction of balanced dance training programs; it suggests moving beyond the consideration of purely physiological parameters. Ekert's recommendation is for dance curricula to include a blend of somatic practices and conditioning to supplement dance training, allowing the technique class to concentrate on the development of skills and artistry.<sup>20</sup> Fitt comments that additional objectives for dancers should be conditioning for alignment, neuromuscular coordination, and relaxation.<sup>22</sup> Franklin states that dance conditioning needs to achieve a highly developed sense of balance, timing, rhythm, and orientation in space and that cardiovascular fitness, strength, balance, flexibility, alignment, and imagery training need to come together as a unified whole. He also believes that considering the dancer as athlete and as artist is a mind-body exercise and explains that motor control and learning research offers invaluable information that can improve the dance technique class while preserving its artistic goals and integrity. The use of imagery and visualisation could support neural re-patterning, while muscle changes are achieved through traditional conditioning work.<sup>32</sup>

Phillips distinguishes between strength training and stability training: the learned skill of effective muscle recruitment. He writes that traditionally the assumption has been made that by increasing the power and strength of various muscles there should be improvements in performance. However, the issue of *regression* needs to be taken into account. By approaching strength development from a motor learning perspective, precise motor activation patterns can be established that do not automatically

regress when the demand (overload) is removed. Developing an awareness of these movement patterns has the potential to produce longer-term benefits for dancers than does strength training.<sup>37</sup>

A particular area of motor learning that relates to the concept of specificity is “transfer of learning”: the positive or negative influence of previous experiences on performing a skill in a new context. Assumptions are made that enhanced strength or flexibility in a conditioning program will transfer to improved skills, such as jumping. However, there are concerns that body development from sessions outside the technique class may not be reproducible from one context to another. Considering concepts inherent in motor learning theory, it may be more beneficial not to train muscles in isolation, but rather to group them together to reproduce a specific firing sequence.<sup>2,22,38</sup>

Krasnow has developed the C-I Training system, aiming to simultaneously improve balanced muscle function and address neuromuscular re-patterning. She proposes that the combination of conditioning work with specific images that can be used in complex dance sequences assists in transfer of learning. By considering the specificity principle, the program incorporates tasks that relate as closely as possible to dance practice.<sup>39</sup> Recently, Batson has suggested considering the work-to-rest ratio in dance practice and the use of tapering (appropriately timed reductions in training load) for efficient performance. She cites studies showing that distributed practice (the amount of rest equal to or greater than the amount of work) increases power and endurance in weight lifters, and points out that the concept of rest intervals is significantly absent in dance pedagogy.<sup>40</sup>

It has also been suggested that fitness can be approached from objective and subjective viewpoints. The former is more physical, can be measured, and concerns bodily symptoms and functions; the latter is related to individual’s emotions and psychology.<sup>14</sup> Some psychological concepts,

such as motivational strategies and goal-setting, could be addressed in supplementary training sessions in a more direct way than in technique class, where time is short and other concerns need to dominate. In a study by Rafferty and coworkers<sup>30</sup> it was observed that students in supplementary dance-specific fitness sessions found a more holistic approach and the increased knowledge and awareness produced by relaxation techniques (as an element of fitness) to be very valuable. Motivation for exercise appeared to be increased, and qualitative data revealed a perceived reduction in stress, tension, and frustration.

## Conclusion

While any change in traditional dance training regimens must be approached cautiously to ensure that enhanced artistry and expression remains the primary goal,<sup>2,5</sup> opinion suggests that unless the physiological dancer is honed to the same extent as the artistic dancer the limiting factor in their development will potentially be their physical conditioning.<sup>31</sup> To ignore the physiological needs in the training of today’s dancers is to deny development of the art form. It is the responsibility of dance teachers and educators to continually develop their knowledge and understanding of the physiological demands of dance and of the options for either integrating physical fitness training into the technique class itself or providing it through supplementation. Teacher training programs could consider the inclusion of this type of information in their pedagogy. This might in turn improve attitudes toward dance science and the importance of doing research with dancers.

The question of whether “a fitter dancer is a better dancer” may still need to be answered for some; however, more than 20 years ago Laws stated that the best dancers have an integrated combination of two talents: a knowledge of what is to be expressed and the physical and mental tools to accomplish that expression.<sup>15</sup> A dancer who is able to jump higher, balance longer, and create illusions such as

floating is not necessarily a better dancer, but does have the advantage of a greater range of tools with which to produce the desired images of dance choreography. More recently Clarkson and Skrinar agreed that an efficient and able body supports greater freedom for artistic expression.<sup>9</sup>

It may no longer be necessary to ask *if* fitness should be included in a dancer’s training, but *how* it can be holistically implemented to best effect. Dance should learn from sports training and initiate, and promote awareness of the importance of, physical fitness for dancers. It is time to develop a truly dance-specific approach, one that considers the unique relationship between physicality and art. As usual, further research is the key, especially relating to the integration of somatic, psychological, and motor learning principles.

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