The values of physical fitness testing for dance

This essay aims to discuss the values of physical fitness testing for dance as a means to improve performance. This does not simply mean aerobic fitness, but also the values of devising tests for other areas of physical fitness that are important within dance.

Physical fitness testing appears in many sporting activities ranging from cycling and sprinting to multidisciplinary activities such as gymnastics. The tests are used to indicate the athlete's current fitness levels during their different stages of training, and can be used to highlight their strengths but more importantly the areas that may need improving. One of the more popular tests includes the Wingate Sprint Cycle test. This test requires the athlete to pedal as hard as they can on a stationary bike, over a thirty-second time period. The results are displayed on a graph, normally showing a high peak at the start and gradually declining towards the end. Endurance athletes tend not to have as high a peak as the strength athletes, but have better control over the decline (see appendix 1). Another common test is called the Multistage Fitness Test, more commonly known as the 'bleep test'. This test is relatively simple to set-up, perform and to score. The cones are at a set distance apart, a cassette or c-d player is used to play the pre-recorded tape and someone is needed to watch the person being tested, keeping note of the level at which they drop out. This test is more suitable for athletes that rely mainly on their cardiovascular system, as it comprises of running between cones, the object being to reach the other side before the 'beep'. It also has the advantage of being able to test a larger group of people at one time.

Dance, however, is not a sport by nature and its participants are appreciated and marked mainly for their artistic merit and not on how high they jump or for how long they can continue on for. Therefore the Wingate Sprint Cycle Test and the Multistage Fitness Test may not be ideal for testing dance as they are only specific to one task, being cycling or running. Nevertheless, dance has recently been classified as a 'high intensity intermittent exercise' (Wyon, M 2005, Vol 9: No. 1)) and calls upon all the factors that are encompassed under the heading of 'physical fitness'. Therefore dancers could be classified as athletes and would probably benefit from having their own fitness test that is devised and performed within the context of dance. However, 'due to the infancy of dance science, the availability of valid and reliable laboratory and field tests are limited and, therefore, until further research is done, there needs to be a reliance on tests developed in the health and sport environments', (Redding, E and Wyon, M, 2003, Vol 7: No. 1). The importance of testing dancer's fitness as a means to improve performance as well as the issues of validity, logistics and specificity of an all

round fitness test for dancers will be the main focus of this essay in an attempt to prove its value during training.

The main value of testing, as mentioned above, is that the results will indicate the strengths and weaknesses of the dancer. The key areas involved in dance physical fitness are the aerobic cardiovascular system, anaerobic energy producing systems, flexibility, balance and control. There are various tests that assess each area separately, however a test designed for dance needs to combine all these areas into one single test to stay true to the ideal that dance is a multidisciplinary, intermittent activity. Each element of physical fitness is called upon during a dancers performance, therefore each component needs to work in harmony within the body to create the complete illusion of effortlessness that is required for the aesthetics of dance. Once the weaker areas have been ascertained, teachers and dancers can then set realistic goals, either short-term, long-term or both, in order to improve their capabilities. If a dancer demonstrates a good degree of flexibility and control but poor balance and cardiovascular fitness, taking up extra activities outside of training that focus on these weaknesses may be suggested to help improve their overall performance.

Improving all-round physical fitness can have many positive outcomes, the first being a decrease in the rate of injury. A well conditioned, fully functioning body will allow the dancer to perfect their technique during training. Having the energy to maintain the correct posture during fast, strenuous or dynamic movements will prevent the dancer from lapsing into spells of faulty technique, which may incur an injury. An example of this may be presented when a dancer does not execute a safe landing by failing to maintain the ideal foot, ankle and knee alignment at the end of a jump. An ideal landing involves the weight of the body sequentially going through the toes, to the ball of the foot, then the heel, followed by a plié, with the knee in alignment with the ankle and foot, hence 'knees over toes'. If the dancer, through physical fatigue, fails to land in correct alignment, the ligaments and other soft tissues of the lower landing leg will be put under immense pressure to stop the joints, such as the knee and ankle, from dislocating. After repeatedly landing incorrectly, strains, tears and micro-traumas may occur causing the dancer to become injured.

Increased physical fitness may also mean an increase in the number of times a dancer can perform a particular move, thus enabling the dancer to be able to achieve a movement previously deemed too difficult to accomplish. This in turn may raise the dancer's self-confidence as they then strive for the next goal. Increased repetition of a movement during correct postural alignment may also be incorporated into the dancer's muscle memory,

becoming 'second nature' through habit. This could also help the dancer to avoid injury, as in the example mentioned previously involving correct anatomical alignment of the foot and knee during a landing from a jump. This improved muscle memory may also enable the dancer to improve upon their aesthetic quality, as ease of movement will become more evident through the repetition.

Specific areas of physical fitness that could be incorporated into a dance fitness test may include movement that may increase the efficiency of the aerobic and anaerobic energy pathways within the dancer's body. Strong, sharp, quick and controlled movements, using mainly localised muscle groups, rely heavily on the anaerobic system to produce energy, usually lasting for only a few seconds. Sequences that involve travelling and continual movement over a longer, sustained period of time depend on energy produced by the aerobic system. However, as mentioned previously, dance is intermittent and will demand an ever-changing combination of both systems for its energy.

As a dancer is rarely pushed to their maximum aerobic capacity during class, it can be sometimes assumed that more emphasis should be placed on the anaerobic system. However, more and more dancers are realising the importance of cardiovascular training, involving the heart and lungs, and will add extra workout sessions to their programs outside of the dance studio. Cardio-respiratory work such as running, swimming and cycling increases the stroke volume of blood and heart beats per minute allowing more oxygen to be pumped around the body and on to the muscle cells. This will also encourage more capillaries to open to accommodate the increased blood flow. This increased flow may also aid the removal of excess lactate, a by-product of anaerobic respiration, from the muscles. This lactate, known as lactic acid, is used as the body's natural indicator of muscle fatigue and is partly responsible for the burning sensation felt within the muscle towards the end of an exercise,

> *When either fitness levels are low or the intensity of dance is high, or both, lactic acid production is greater than its removal. The substance begins then to accumulate, causing muscle hyperacidity, and eventually brings physical effort to an end. Aspects related to cardiovascular proficiency- such as an increased number of muscle capillaries- may contribute to faster rates of lactic acid removal.*
>
> (Koutedakis and Sharp 1999:17)

Improving the aerobic and anaerobic pathways will allow the body to build up a strong base that will withstand a programme to improve flexibility, balance and control, all deemed to be

important components of physical fitness. A dancer's body needs to be physically fit enough to withstand the constant repetitions involved in training in a multitude of techniques, and to be able to endure the possible gruelling rehearsal periods and performances. A test that incorporates both elements of the energy producing pathways will help to identify a possible weakness that may be detrimental to the dancer's development.

There are a number of factors that need to be considered if the test is to be successful. Each area of physical fitness needs to be addressed within the test to make it specific to dance. The types of movements that need to be included are travelling sequences with multi-directional pathways, static holds, floor work, leg extensions, sustained balances, stationary and travelling jumps, to name but a few. Making it a multistage fitness test, where each level will demand a higher input of energy, will also make it more of a challenge to the dancer. By dividing the test into four or five levels with a set resting time in between, with level one being simple and low impact, each may contain a development of the movement phrases. For example, if the dance in level one contains movements performed on 'flat feet' with low leg extensions, they could gradually progress onto being performed on demi pointé with legs at roughly 45° in extension at level two. During the last level the steps could eventually become huge leaps, with tucked-up underneath legs, with the legs thrown as high as they can be whilst in extension.

Ensuring that the test can be deemed valid through examining a small group of dancers first for their VO2 Max, lactate threshold and heart rate (see appendix 2, 3 and 4), will indicate whether or not the test will be challenging and by how much. If the results from the test group show that there is an increase in effort made during the different stages of the test, then it is probable that it will transpire to other dancer populations. This way, scientific data will not be required for every dancer who undergoes the test, as the previous results would have already predicted the outcome. It would be impractical to insist that every dance institution should have equipment on hand to be able to scientifically test each individual dancer. For this reason a perceived rate of exertion could be used to identify how a dancer is feeling during each stage of the test (See appendix 5).

One area that may become problematic would be the issue of teaching the fitness test to teachers in order for them to then teach it to their students. For many years, the Royal Academy of Dance (RAD) and the Imperial Society of Teachers of Dance (ISTD) have published various books containing their dance syllabi in written format, accompanied by various 'refresher courses' throughout the year. The problems with these methods are due to

the reality that dance teachers will often teach their dancers their own interpretation of the exercises that have been written down and others may not attend these refresher courses as they are too expensive. To combat this, the RAD and ISTD have recently produced a video and DVD that show the correct way of how they want the exercises to be done. For the dance fitness test to be taught correctly, perhaps using the RAD and ISTD's methods of using a DVD or video recording, written instructions as well as refresher courses, could be used to make sure that the test is performed in the same way universally.

Other areas that could be looked at when devising and executing the dance fitness test would be to determine at which point a dancer is deemed to have reached their limit. A dancer may be able to complete the test but probably at the expense of not maintaining their technique. Therefore a list of criteria should be made to ensure that a dancer is really using all the elements of physical fitness to maintain their correct dance technique. Some of the criteria may include keeping to the counts, pointing of the feet during a jump, hitting the correct alignment during an extension or maintaining a balance for the set amount of time.

The dancer should not necessarily be pulled out of the test; however it should be noted at which points they did not meet the criteria. For this, a video recording of the dancer performing the test should made and shown to them afterwards to illustrate where these instances may have occurred. Hopefully, by doing the dance fitness test on a regular basis, as well as partaking in extra relevant training, the dancer will eventually be able to meet the set criteria by improving their aerobic fitness and maintaining their stamina for longer. As Dr Karl Cooke stated in his seminar, 'technique is the issue- efficiency of movement. When testing fitness, the test subject has to keep on going until they cannot continue anymore', (Seminar 1). As mentioned previously, during a dance class a dancer is not normally required to push themselves to exhaustion, therefore a dance specific test may be an ideal way of putting a dancer into that physically demanding situation.

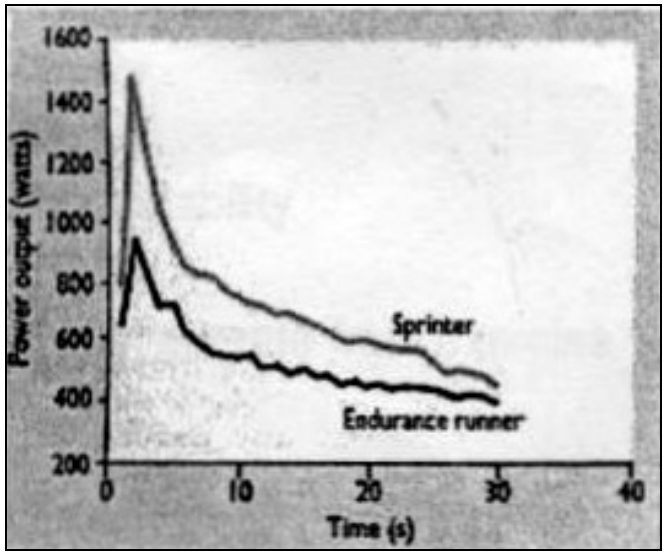
In order for the test to be appealing for a wider audience, elements such as the choreography and music should be looked at. Contemporary and modern dance is studied at many different levels, from GCSE and B-Tech to degree level and intensively at vocational dance institutions. The test needs to be at a level to challenge these dancers during their training. Some movements may need to be altered to make it more relevant for male dancers, for example the use of masculine arm lines and higher jumps could be added to their criteria, with perhaps, an emphasis on strength and control. The music needs to be motivating, perhaps developing layers for each level to reflect the build up in intensity of the movements. Ballet

schools also have classes in contemporary and modern dance, however, the ballet dancers may benefit from having a fitness test designed especially for them using only classical ballet steps.

Devising a dance fitness test needs to be specific to dance. For the test to be relevant, valid and appealing, it will need to incorporate all the elements of physical fitness into one multistage test that will focus on aesthetic quality, technique and musicality, all of which make dance an art. Motivating music, intelligent and challenging choreography, as well as set criteria and perceived exertion scores will help the dancer and their teachers identify the weaker areas in their dancing. After eradicating those weak points through additional training, and possibly lowering the risk of injury, a dancer can then continue to work towards improving their overall performance, balancing correct technique with artistic flair.

Appendix

1. This graph demonstrates the difference in results between an endurance and sprint athlete.



(Picture taken from seminar 2)

2. **VO2 Max** – 'Fitness can be measured by the volume of oxygen you can consume while exercising at your maximum capacity. VO2 max is the maximum amount of oxygen in millilitres, one can use in one minute per kilogram of body weight' (www.brianmac.demon.co.uk).

3. **Lactate Threshold** – 'The point at which lactate production increases dramatically' (Class notes). Lactate levels are tested via a blood sample taken from the earlobe or fingertip.

4. **Heart Rate** – The number of times the heart beats in one minute. Heart rate can be recorded by using a heart rate monitor.

5. **Perceived Exertion** - One of the main perceived exertion scales is known as the Borg Scale of Perceived Exertion (BSPE). This scale is used by athletes or performers to indicate how they feel after a specific exercise;

6 ~ 20% effort ~ very, very light

7 ~ 30% effort

8 ~ 40% effort

9 ~ 50% effort ~ very light - gentle walking

10 ~ 55% effort

11 ~ 60% effort ~ fairly light

12 ~ 65% effort

13 ~ 70% effort ~ moderately hard - steady pace

14 ~ 75% effort

15 ~ 80% effort ~ hard

16 ~ 85% effort

17 ~ 90% effort ~very hard

18 ~ 95% effort

19 ~ 100% effort ~ very, very hard

20 ~ Exhaustion

Research into the reliability of the Borg scale and HR, Lactate Threshold and VO2 Max suggest that there is a strong correlation between the sets of results. Therefore the conclusion was that the 'study supports the use of (BSPE) scores as a means of assessing exercise effort' (www.pponline.co.uk)

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