

CARDIOVASCULAR ENDURANCE TRAINING FOR YOUNG DANCERS

A comparison



Professorship Excellence and well being in the performing arts
By Yvonne Beumkes
Supervision: Professor Dr. Anna Aalten

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1. Motivation

"The work of dancers today embraces not only the art of communicating the joy and aesthetics of movement executing in perfect harmony and style, the power to express ideas and emotions through movement and musicality and the effortless display of technical virtuosity but these days a far more athletic and often acrobatic approach to movement is required which choreographers are insisting on more and more as a result of the increased cross fertilization between classical ballet and contemporary dance". Sir Peter Wright, quoted in Yiannis Koutedakis (2005). I found the quote truly excellent. I trust that Koutedakis does not mind me using it. (1)

Contemporary choreography, as Peter Wright points out, is a fusion of many dance styles demanding from all dancers speed, vitality, virtuosity, athleticism to the point of acrobatics, flexibility and unrelenting endurance. Today's dancer must be equipped to dance a large range of styles and techniques, and to cope with the ever more eclectic demands of innovative choreography. Contemporary choreographers make great demands, and are continually making greater demands, on the dancers physical capabilities.

Why is fitness important in dance?

In her book *Finding Balance. Fitness, Training and Health for a lifetime in dance* (2) Gigi Berardi points out that:

- fitness provides strength, power and stamina as well as resistance to injury
- this enables the dancer to better deal with the demands of dance training and performance
- fitness enhances the function of energy pathways involved in the execution of various exercises and dance routines > neural conditioning
- studies suggest that a fit and healthy dancer is less vulnerable to injury
- studies suggest that a fit dancer needs less recovery time when injuries do happen
- in many ways fit dancers work less hard than unfit dancers

Fitness training comprises of many aspects:

- muscular strength
- cardio respiratory endurance (aerobic training)
- flexibility
- anaerobic training
- muscle power and endurance
- joint mobility
- proprioception

Cardio respiratory endurance training is one of the vital elements in the physical training of today's dancers. Stamina has always been required in choreography. No dancer who has performed in *Napoli* will forget the stamina needed. The last section of Nijinska's *Les Noces* is one continual essay in jumping, and not to forget the opening scene of Balanchine's *Serenade* where dancers twirl and turn as if blown by the wind. Contemporary choreographers exploring all facets of movements, fusing many forms of dance with sport, athleticism, acrobatic

and daily movements require dancers with optimal stamina to be able to perform their choreography and dancer's require optimal stamina to meet the requirements of the choreographers whilst having sufficient resistance to injury.

As a ballet teacher I am interested in exploring new ways to help my students cope with the today's choreographic demands. The ballet class has evolved over a long period of time and is structured according to age-old traditions. In the course of dance history enlightened teachers have given the ballet class a logical and functional structure. These teachers did not have the opportunity to work with the information that sport science offers us today but had a natural intuition of the mechanics of the body and prepared their dancers for the evolving demands of their contemporary choreographers whilst simultaneously retaining the integrity of the ballet class.

Nowadays, fitness training is a vital part of the education of young dancers and absolutely essential for their future well being. The professorship Excellence and well being in the performing arts at Codarts has given me the opportunity to undertake a practice based research project exploring the effect of two different forms of cardiovascular endurance training with pupils of the HAVO voor MUZIEK en DANS with the hope of answering the question:

How to efficiently integrate cardiovascular endurance training for young dancers into the regular dance curriculum?

It is my conviction that the ballet class or the dance class can contribute to endurance training and dancers and dance teachers need not always resort to the training designed for members of the sport world. I feel there is a tremendous lot to learn from sport medicine, but then it is up to dance teachers to apply this knowledge to the dance. Therefore in this research project I have chosen to compare two different approaches to cardio respiratory endurance training:

- sport aerobic dance training
- dance orientated aerobic training

Why sport aerobic dance training ?

Because this has already been tried, assessed and has been proven itself to be an excellent training to improve endurance.

Why dance orientated aerobic training?

Because I personally feel that cardio respiratory endurance can also be trained from within the dance class itself based on our knowledge of sport training. This is a wonderful opportunity to conduct practice based research to ascertain if in fact a dance orientated aerobic training can meet and equal the results of a sport aerobic dance training.

Why ballet orientated?

Basically because I teach ballet and feel most comfortable in the technique I know best. The principles on which the programme is based should prove interchangeable into various techniques.

There have been many studies on the importance of cardiovascular fitness for dancers. That cardiovascular endurance training should be part of a dancers training is a given fact. There has been quite some research involving professional dancers and older vocational dance students. Very little work has involved the young elite dance pupils who take daily dance classes next to their secondary school training. When considering this age group we are faced with somewhat different problems than if we were to study the older dance student or the professional dancer. This research project will involve 45 pupils of the Rotterdamse Dansacademie aged between 12 - 15 years old. They all attend the HAVO voor MUZIEK en DANS, the junior school of CODARTS, University of Professional Arts Education.

In this research project I have aimed to:

1. explore two ways of approaching cardiovascular endurance training in the dance class, for elite young dancers aged between 12 -15 years old.
2. compare the physical result of the two different approaches
3. examine the young dancers own experience and feelings towards the training by looking at different aspects (endurance, enjoyment, class involvement, competition, self-esteem)
4. examine the interaction of both forms of training on the actual teaching of ballet and dance class
5. receive feedback from both the ballet and modern dance teachers on the effect of the training
6. ascertain if the training has an effect on injury prevention .

The aim is to answer the question how to efficiently integrate cardiovascular endurance training for young dancers into the regular dance curriculum.

2. Dance orientated aerobic training: the benefits

Dance is a unique balance between the physical, musical, interpretative, creative and artistic. In a dance class many aspects, varying from technique, to musicality, to strength and flexibility, to stamina, to quality and artistry need to be addressed. The dance teacher has the responsibility of training all the different facets and I feel that it is possible to address several of the aspects mentioned above, whilst training cardiovascular endurance. It is my opinion that a dance orientated aerobic training can encompass a multitude of skills.

1. Dance orientated aerobic training relates directly to aims of the dance class and is therefore a more efficient form of endurance training for dancers than a sport aerobic dance training. Sport aerobics trains endurance and that is in itself of vital importance, but apart from that the other aspects pertaining to the training of dance are not acknowledged.
2. The dance orientated aerobic training takes place at the end of class. The dancers need no separate warming-up and this saves valuable classroom time.
3. The dance orientated aerobic training is developed from skills already mastered by the pupils.
The young dancer:
 - is required to perform steps and movements which he/she has already mastered in the previous school year
 - by repeating these well-known steps and movements in non-stop repetition the dancer is consolidating the previously learnt work. The teacher need not practice these steps in class, thus saving time
 - muscle memory and muscle patterns for specific ballet/dance movements is being trained
 - the teacher will not correct each separate movement thus the young dancer is learning to take responsibility for the quality of her/his own work
 - is required to remember the combination of exercises and sequence
 - is required to work as a part of a unit feeling the competitive sensation of achieving success together
 - works with spatial design very much like a choreography. Lines, circles and spacing
 - plays a vital role whilst maintaining the continual motion. You could in fact see the training as a piece of choreography where all the dancers must work simultaneously, non-stop for a minimum of 15 minutes
 - needs to be flexible, being able change between jumping, moving, balancing and control without any time to adjust. This dancer must anticipate
 - must be rhythmical and musical.
4. The dance orientated aerobic training is flexible. Steps and movements can be changed at any given moment. New steps that have been mastered may be exchanged for an older sequence. The training is not about the actual movements rather about the idea behind the movements.
5. The dancer needs to be alert. The teacher can change the training slightly day per day and the dancers have to react quickly. Likewise the teacher may give commands during the training

itself; the dancers need to adjust at any given moment whilst retaining all the necessary performance skills.

6. The training can be changed according to season, to work pressure, to performance requirements.
7. The dancers should perform the entire training sequence artistically; retaining posture, poise and quality. In this way the young dancer is taught holistically, performing whilst training. This aspect of the training is directly linked to performance skills.
8. Working together in a choreographic setting demands that the dancers perform as one unit. This enables the dancers to practice spacing and teamwork; both of which are not readily part of a normal dance class but an absolute necessity for performing.
9. Competition plays a vital role; dancers working as a team want to achieve a good 'performance'.
10. The training is all about dance and young enjoy dancers enjoy dancing.

Research group

Two groups of dancers, C1 and C2, have taken part in the experiment. The groups C 1 and C 2 comprise respectively of 22 and 23 pupils. Both groups consist mainly of girls. The boys are in the minority. C1 has 5 boys and C 2 has 2 boys. During the time of the experiment, three pupils changed classes. One girl moved from C2 to C1. Two other pupils (a boy and girl) switched from C1 to C 2. The pupils are beginners in their second or third year of study. Their level of work is elementary.

3. Specific considerations for young elite dancers

"The difference between professionals and students is that the main goal of professionals is performance while for a student it is technical perfection." Matthew Wyon (3)

Specific aspects related to the 12-15 year age group

All the young dancers participating in this research project are pupils of the HAVO voor MUZIEK en DANS. Their learning environment is characterized by:

Time: heavy schedules

The young dancers, aged between 12 and 15, have a daily ballet class (90 minutes). Twice weekly they have a modern class (90 minutes). Their school days are long and intense; many of the youngsters travel to and from school for more than an hour. There is always homework to be done in the evenings. Given this time factor it is clear that cardiovascular endurance training should take place within school time. Training outside school is not an option; for most pupils extra training after school (either in a sport school or individually) is too time consuming and in all probability too demanding on these young physiques.

Duration of the ballet class

Within these 5 ballet classes a week it is obvious that there is relatively little time to spend on aspects non-related to the teaching of ballet. Teaching youngsters involves explanation and teachers need to give pupils time to understand and assimilate the information.

Teachers must also work on aspects such as developing strength, agility, turns and jumps, not to forget artistry, musicality and various other elements all needed in the development of a dancer. *Fitness training is but one spark of the dance wheel.*

Growth spurt

Boys and girls in the age group of 12 to 15 years are in the growth spurt period.

The training needs to take this into account. The programme needs to be aware of not over working the young dancers (see also Appendix A).

Puberty

All the pupils are in a certain phase of puberty. Their bodies and minds are in a constant process of change. Training needs to take these physical and the accompanying psychological changes into consideration. An endurance programme must be applicable to their age, physical and emotional development.

Sports

Our society has changed over the past years. Children no longer play outside for hours at a time. This is perhaps due to safety precautions, the television or, these days, the ever magnetic allure of the computer. The HAVO pupils have very little time for outside activities and their homework is done on computers. They have very little physical activity outside of school. Very few pupils participate in sporting activities. Furthermore the school advises against most sports. The HAVO

pupils have no sport training during school hours. The hours usually given to school sport are allotted to dance lessons. It is therefore necessary to train endurance in the dance classes.

Physical and emotional aspects

In *Dance Teaching Essentials*, published by DANCE UK in 2002, dance teachers are informed about specific elements to consider when teaching the 11 to 18 year age group (see Appendix B).

4. General outline of the training programmes

4.1. Sport aerobic dance approach (given to C 1)

A workshop on condition training was given Erzi Hoogveld, teacher at the Hogeschool van de Kunsten in Amsterdam. Hoogveld is a specialist in all form of fitness training. She teaches fitness to dancers of all ages at the Theaterschool. The aerobic dance fitness programme, used in this experiment, was inspired by her workshop.

Structure:

- warming up
- low impact movements
- high impact movements
- cooling down

The movements chosen were those familiar to aerobic dance programmes.

- steps and movements on the spot and from the spot (low impact)
- the same movements in a more lively fashion
- these were developed into a more jumped energetic movement (high impact)
- low and high impact movements were alternated
- the movements were taken for the most part on the spot or moving too and fro and around the spot
- the focus was on leg movements where the arms went along with the movement

The dancers wore aerobic shoes during the training.

The training was performed during the last 15 minutes of class.

The pianist accompanying the ballet/dance class played appropriate music to capture the sphere of the aerobic section.

The above programme was given during the first weeks. The young dancers were asked their opinion of the training in the first questionnaire. Many dancers reported that the training lacked challenge. Most of the dancers did the training with ease. The programme was then revised as follows:

- the warming up section was omitted (the class itself was considered sufficient warming-up)
- basis aerobic movements were still used but arms movements were added
- more spatial design was introduced
- jumping started earlier in the training
- low impact and high impact still alternated with a greater emphasis on high impact
- an active jumped and moving diagonal was added
- a more holistic approach was introduced

These additions and changes had the required effect. The training became more intensive and this was acknowledged by the most of the dancers.

4.2. Dance orientated aerobic approach (given to C2)

The training takes place at the end of the ballet class. The class consists of barre, centre, adagio, pirouettes and allegro. The training is done in the last 15 minutes of class. The dancers wear ballet shoes for the training. Basically the training is a non-stop choreography of 15 minutes. The body is thoroughly warmed by the ballet class. There is no warm-up section in the training. The dancers are divided into 3 groups. Each dancer has a set place as in a choreography. The class pianist accompanies the training; a slow waltz.

The steps and movements chosen are those that the dancers have already taught in the previous year.

The choice to use well known steps and movements is deliberate:

- having mastered the steps and movements the dancers need not 'think' about the way to perform them
- the steps and movements are regularly practised during the training and need not be practised regularly during the actual teaching section of the class
- the dancers knowing the steps and movements can keep improving them technically but also artistically

Structure:

- the dance orientated approach consists of three set sequences.
 - A: slow and controlled movements (*port de bras, plié, adagio*)
 - B: dance movements (*waltz, temps levé, pirouettes*)
 - C: jumps; (*varying from preparations, to single jumps to continuous jumps*)
- Each particular sequence is danced for 3x 16 bars of a steady 3/4 rhythm.
- Following each sequence there is a running sequence (stage running) of 16 bars $\frac{3}{4}$
 - During this section the dancers run to their new positions in order to start the next sequence.
- This pattern (a sequence followed by running) is repeated 6x times in all
- The training is completed with a port de bras to cool down.

Pattern:

- section A: 3 x 16 bars slow controlled movements
 - run: 1 x 16 bars to run to next position
 - section B: 3 x 16 bars of dance movements
 - run: 1 x 16 bars to run to next position
 - section C: 3 x 16 bars of jumps
 - run: 1 x 16 bars to run to next position
- Repeat the entire sequence (12x16 bars)

Followed by slow cooling down: relaxation port de bras

The three groups work simultaneously, each group dancing a different sequence.
The pattern works as follows:

group 1	group 2	group 3
sequence A - run sequence B - run sequence C - run Repeat all Port de Bras (cooling down)	sequence B - run sequence C - run sequence A - run Repeat all Port de Bras (cooling down)	sequence C - run sequence A - run sequence B - run Repeat all Port de Bras (cooling down)

Daily adjustments

- the starting sequence changes with each training session

For example:

Monday > Group 1 starts with sequence A

Wednesday > Group 1 starts with sequence B

Friday > Group 1 starts with sequence C

- Likewise, the other groups alternate the starting sequence with each subsequent training

- The order of the starting sequence can change weekly to avoid a set pattern on Monday etc.

- Each training session slight changes are made:

- sometimes the entire programme starts to the right or to the left

- sometimes, for example, Monday to the left, Wednesday to the right and Friday to the left

- sometimes the sequence is done alternatively to the right and to the left (e.g. first sequence starting to the right, second starting with the left foot and so on)

- these changes are not set; rather the dancers are told just before starting the training or in fact during the actual training itself (to keep the dancers very alert and adding to the fun)

- dancers continually have a new position in the room and must adjust to space and spacing

- the front can also be changed.

Difference in intensity

- The intensity of the training is influenced by the sequence with which the dancer starts.

It makes a difference if you start your training with balancé or adagio movements or move from allegro to adagio. The different movements make different demands on the body and endurance.

- Dancers, answering the questionnaires, report that it is easier when you start with the jumping section and finish with less energetic movements. It is much harder to finish with the jumping section.

- Many dancers report that the most difficult moment is about halfway and then they redeem their energy.

5. Research method

'Armed with knowledge and understanding, you are empowered' Cynthia Harvey (4)

In this research project several different methods were used.

An experiment with two different ways of training cardio respiratory endurance with young elite dancers between the age of 12-15

Training

- >Group 1 (C1): 3x weekly a sport (aerobic dance) orientated training programme
- >Group 2 (C2): 3x weekly a dance (ballet) orientated training programme

Injuries

- Dancers filled in a questionnaire about injuries prior to the programme
- Injuries were monitored before starting the training programme
- Injuries were monitored throughout the entire programme

Physical endurance

To ascertain the cardio respiratory endurance of the dancers a shuttle run took place

- in November 2005 (before the training programme)
- in March 2006
- the results of the two shuttle runs were compared
- the dancers were asked if they felt that their endurance had improved and how it had improved.

Survey looking into the young dancer's impressions and opinions

- The young dancers filled in three questionnaires.
The questions covered physical, psychological, social and artistic aspects.
- questionnaire 1 > November 2005
- questionnaire 2 > December 2005
- questionnaire 3 > March 2006

- A separate questionnaire was given to the boys

- Two group discussions. All the pupils participated
- discussion 1 > December 2005
- discussion 2 > March 2006

Comparison of both forms of training by dancers who had done both forms

By pure coincidence three dancers switched classes in the course of the training programme. These dancers were asked to compare both training forms.

Feedback form teachers involved in the training

During the entire training period the four teachers involved in the actual training kept contact and exchanged thoughts and ideas. Whenever it was needed, the programme was revised

Dancer's logbooks

Logbook: 10 pupils were asked to keep a logbook during the training period. The pupils were chosen for their different physical types to ascertain if the training has a different effect on different physiques.

A study into how other vocational schools approach fitness training as a whole and specifically cardio respiratory endurance training for this age - group

About 25 schools and teachers were sent questionnaires asking questions relating to fitness training as a whole and cardio respiratory endurance training in particular. Up to date 12 replies have been received. Replies have come from England, Canada, Belgium, America, Germany and Sweden. I have had interesting contact with various people.

The information received gives a good idea of fitness training elsewhere. I hope to receive more replies and to intensify my contacts. This project is stimulating but unfortunately too expensive to be taken up in the present research programme. A good start has been made and I hope to follow it up next year.

6. Time schedule September 2005 - August 2006

2005 September - October	<ul style="list-style-type: none"> * general preparations * both groups are taught their respective training programmes * start research
October	<ul style="list-style-type: none"> * questionnaire for dancers: monitoring injuries * after the Autumn holidays the pupils will slowly start to train 3x weekly but not yet the entire length of the programme * letter to parents requesting permission to allow their child to participate in a cardiovascular test/ Shuttle Run
November	<ul style="list-style-type: none"> * cardiovascular test; zero shuttle run * the week after the cardiovascular fitness test the training programme will fully implemented * at the end of the first full week the pupils will be asked to fill in a questionnaire about their experience and findings * questionnaires sent to schools abroad
December	<ul style="list-style-type: none"> * the fitness programme will be repeated 3x a week. * injuries will be monitored * last week before Christmas holidays pupils will be asked to complete questionnaire. * class discussion with the young dancers * feedback from teachers * questionnaires sent to schools abroad
2006 January	<ul style="list-style-type: none"> * after Christmas holidays a careful start to aiming to repeat entire programme by the end of the first week
February	<ul style="list-style-type: none"> * aim to train 3x weekly * one week holiday. * additional work: prepare for demonstration class and test classes
March	<ul style="list-style-type: none"> * end of research programme is approaching. * pupils will be asked to fill in 3rd questionnaire * class discussion with the young dancers * feedback from teachers * second cardiovascular test: control shuttle run
April - June	<ul style="list-style-type: none"> * collection of data * results * discussion on implementation with the HAVO staff for 2006-7 * presentation for staff RCA
August	<ul style="list-style-type: none"> * workshop with HAVO staff to develop endurance training programme for all HAVO dancers.

7. Results: comparison of the two aerobic training methods

That cardiovascular endurance training is an important part of the training of contemporary dancers needs no discussion; how to approach endurance training for young elite dancers does. This experimental research project examines two methods of cardiovascular endurance training and their integration into the daily dance class of adolescents.

Two groups, of the same age and level of work, took part in the project. Both classes trained three times weekly, the cardiovascular endurance training taking place during the regular dance class. One class (C1) examined the effect of sport (aerobic dance) training; the other class (C2) examined dance orientated aerobic training based on classical ballet technique.

In this report:

- Sport aerobic training refers to aerobic dance training, generally referred to as aerobics. The dancers train in aerobic sport shoes.
- Dance orientated aerobic training refers to training developed from an existing dance technique. In this experiment the training was developed from classical ballet technique. The dancers train in ballet shoes.

The dance orientated aerobic programme remained virtually unchanged during the entire experiment. The sport aerobic training, after receiving feedback from both dancers and teachers, was intensified.

The research was approached from various angles. Physical aspects, including the occurrence of injuries, were monitored, Dancers were invited, via questionnaires and interviews, to tell their part of the story resulting in diverse psychological and emotional insight. Last but not least the practical aspects of integrating cardiovascular training into the teaching of an actual dance class were looked into; the teachers were interviewed asked to give their views and opinions about the process and progress of the entire experiment.

7.1. Physical aspects

A shuttle run was held before starting regular endurance training. A second shuttle run was held at the end of the experiment. Unfortunately the second shuttle run took place after a performance night, so the dancers did not perform at their best.

On the grounds of the results gained by the two shuttle-run tests we can say that:

- the improvement in stamina was not statistically significant; individual scores showed some degree of improvement
- there was no difference between the two groups, so dance orientated aerobic training can achieve the same physical results as sport aerobic training.

In the final questionnaire the dancers from both groups were asked if they felt that endurance training had an effect on their dance classes or in their daily lives.

With the exception of three pupils (two in the sport aerobic programme and one in the dance orientated aerobic programme) the dancers reported feeling fitter. Many of the dancers felt that

their stamina had improved and felt that the dance lessons had become easier because they could give a greater physical effort without becoming too tired. Comments as *'I found the training a good test for myself; I continued even though I felt exhausted. Because of the training I push myself more in class these days'* are not uncommon.

A number of dancers, from both training forms, mentioned that they were less tired in the evenings; had more energy to do their homework.

Generally the dancers reported that jumping has improved and that it was more fun to do because they could jump longer without becoming exhausted.

To the question whether the dancers felt fitter in their daily life nearly 64% of the sport aerobic group and 74% of the dance orientated aerobic group felt that the endurance training had made them feel fitter in their day to day life. Regardless of training type the young dancers said that they now chose to take the stairs instead of the lift. Likewise they now run to catch a bus or metro when previously they were content with waiting for the next public transport to come along. Some dancers reported that cycling to school these days is easier and they are no longer out of breath on arriving at school. The dancers are learning to distribute their energy efficiently in and outside of the classroom and enjoy the pure physicality of movement, feeling fitter and wanting to feel even fitter.

There is however more than purely the physical aspect to be considered. Various dancers report that they feel more energetic after successfully completing the training programme. They say: it gives a kick *'to push yourself to achieve more'*. Some dancers are really getting involved. They chose to do 'extra' training by choosing to run up and down the stairs, walking instead of taking the bus for short distances because they want to improve their fitness, enjoy the feeling of being fit and realize that fitness can be achieved in many ways.

All teachers who participated in the experiment agree that endurance training is beneficial to the training of young elite dancers and that endurance training should be part of the school curriculum.

The dancers had gained more stamina and endurance. This was not only reflected in improved allegro but in the general pace of the class; the dance class became more aerobic and teachers found that they could demand greater physicality.

Training is stimulating for both dancers and teacher. Many dancers learned to push themselves passing one's own limit and reaching to new goals. A side effect of the training is that teachers are quickly able to see which dancers are able to meet the challenge. The programme revealed much about the individual dancers themselves. Strongly motivated youngsters really went for the programme; no matter what happened they finished the sequence. Others, who always needed to be stimulated in class, seemed to constantly need to be 'pushed' during the training. Very often they were the ones to 'slow down', 'to mark', or to find the physical effort too demanding. It is fair to say that endurance training gives the teacher a glimpse into the psychological make-up and physical motivation of the dancer.

Teachers noticed that dancers with a natural low muscle tone showed little physical improvement even if those dancers showed great motivation and perseverance.

This observation raises the question if indeed a 'standard' endurance programme is suitable for training dancers with a low muscle tone and secondly, if their stamina can be trained sufficiently to meet the demands of contemporary choreography.

7.2. Injuries

All the dancers who participated in the experiment answered a questionnaire, inquiring about injuries, before commencing the training programme. The dancers were also asked if they had slight aches or discomfort in a particular area. During the entire programme teachers, of both groups, monitored injuries and aches and pains.

Injury Questionnaire (October 2005)

Of the sport aerobic group twenty-three (23) dancers answered the questionnaire.

Fourteen (14) of these dancers reported having either an injury or a slight aches/discomfort before starting the training period.

Of the dance orientated aerobic group twenty-two (22) dancers answered the questionnaire.

Nineteen (19) of these dancers reported having either an injury or a slight aches/discomfort before starting the training period.

Dancers reporting injury or discomfort

	Number of dancers answering the questionnaire	report injury or discomfort
sport aerobic	23	14
dance orientated aerobic	22	19

Distribution of injuries and minor aches/ discomfort

	sport aerobic	dance orientated aerobic
Injuries	3	6
Minor aches / discomfort	13	26

Some dancers reported have more than one minor pain or discomfort. All entries have been noted. Injuries mentioned included: groin (1x), knees (3x), ankles (2x), back (2x), hamstrings (1x). Minor aches or discomfort included: knees (11x), feet (5x), ankles (9x), back (5x), hips (3x), hamstring (1x) and groin (5x).

Final Questionnaire (March 2006): the dancers were asked to report their injuries and minor aches/ discomfort at the end of the training period.

Of the sport aerobic group twenty-two (22) dancers answered the questionnaire

Of the dance orientated aerobic training twenty-three (23) dancers answered the questionnaire.

Distribution of injuries and minor aches/ discomfort at the end of the training period

	sport aerobic	dance orientated aerobic
a: I am still troubled by my old injuries	1	1
b: At present, I have no problems	17	21
c: I have been injured/developed an injury in these last months.	4	1

Types of injuries reported

C1: sport aerobic training: three dancers complained about their knees and one dancer mentioned a slight irritation of the foot.

C2: dance orientated aerobic training: One dancer replied that she had no problems but added that she occasionally 'felt' her knees and ankles. Another dancer replied that she had more trouble with her back.

7.3. Sport aerobic training

In the sport aerobic programme 17 dancers reported to have no injuries at the conclusion of the experiment. This in comparison to the 3 injuries and 12 minor aches/discomfort reported in the initial questionnaire.

Four dancers had developed a problem, which in all probability may be due to the consequences of the growth spurt in relation to endurance training. However, teachers reported that, during the experiment, a number of dancers complained of pain and discomfort in the lower extremities (shin, calves, knees and ankles).

We need to be aware of the effects of sport aerobic training on dancers in the growth spurt. We could ask ourselves the question if in fact sport aerobic training is suitable for young elite dancers. Further research in the area is advisable.

7.4. Dance orientated aerobic training

Many dancers, in the dance orientated aerobic training, initially reported injuries and discomfort. Six dancers report troublesome injuries (knees, back and ankle) and 18 dancers report minor aches or discomfort in various areas. Some dancers mention that they have problems in two or more areas.

During the experiment the dancers, except for previously known injuries, did not report any problems. In the final questionnaire 21 of the 23 dancers reported having no injuries or problems.

It is not over ambitious to say that the dance orientated aerobic training causes a minimum of physical stress to young elite dancers.

Conclusions

- endurance training appears to strengthen the dancers
- endurance training has a positive effect in the reduction of injuries
- the dancer appears to be both, physically and psychologically, stronger
- the effects of endurance training appears to carry on in daily-life
- the dancer feel they have more stamina
- dancers enjoy training and enjoy feeling fitter
- teachers must be aware of problems relating to the growth spurt
- over training must be avoided
- sport aerobic training may be stressful to the lower extremities of fine-tuned dance physiques
- dance orientated aerobic training appears not to be stressful to the lower extremities.

7.5. Remarks from the dancer's point of view

Most dancers said to have enjoyed the training. Generally both groups comment that the training

- is fun and you become fitter
- is challenging and pushes you to continually ask more of yourself
- is demanding
- improves your self-confidence
- gives a feel of accomplishment; a greater self-esteem
- the sheer physicality of non-stop training gives a 'kick'
- develops independence; you have to work for yourself
- develops responsibility
- develops stamina which you notice in the dance class and also in daily-life

In the questionnaires the dancers repeatedly point out that they want to improve and understand that endurance training will help them to succeed. They find fitness training challenging in that its pushes them to persevere beyond what they thought they were capable of.

In the last questionnaire all the dancers were asked to choose three of the words below which best describe their opinion of the training programme.

C1 sport aerobics training (22 pupils answered the questionnaire)

C2 dance orientated aerobic training (23 pupils answered the questionnaire)

Dancer's opinions about the training programme

	C1	C2		C1	C2
1: fun	4	2	7: easy	0	0
2: challenging	13	19	8: tiring	4	5
3: important	3	10	9: pleasant, sociable	3	0
4: healthy	5	6	10: perseverance	17	17
5: exciting	8	5	11: competition	0	0
6: boring	0	0	12: aching muscles	3	0

It is interesting to read that even after months of practice dancers of the majority of the C2 dancers still find the training to be challenging. It is also gratifying to read that the dancers do not find the training boring and that many dancers understand the importance of training.

Strange enough the word *competition* does not score at all. This is perhaps because the dancers were only allowed to choose three words and *competition* did not enter into those top three. When questioned the dancers from the dance orientated aerobic training responded that competition, especially in the running section of the training, played a stimulating role.

7.5.1. Sport aerobic training

The dancers who participated in the sport aerobic programme were generally positive about endurance training and the need for endurance training as part of their regular training. In the final questionnaire 9 of the 22 dancers were satisfied with the programme and felt there was no need for any change or improvement. The remaining dancers found the following

- training was not sufficiently demanding.
- the movements were too easy and too repetitive
- the sport aerobic training concentrates primarily on leg movements
- the steps are so easy and that leads to boredom
- you can easily 'fake' that you are working by just following the general trend of the group
- working individually is less fun than working as a group
- there is little competition because you work for yourself
- dancers want to dance and feel sport aerobic training is not dancing
- the training has no connection with the ballet/dance class.

7.5.2. Dance orientated aerobic training

Most of the dancers enjoyed the training. In the final questionnaire 5 of the 23 dancers were totally satisfied with the programme as it was. The remaining dancers noted the following:

- the training remains physically challenging
- new steps and movements should be added regularly
- the choreographic structure should be changed from time to time
- floor exercises and strengthening exercise should be added to the training
- the running section is the most difficult and some dancers suggest that it should be omitted
- that working as a group helps to keep your incentive.

In addition to the above feedback and suggestions the dancers said that they:

- enjoyed the dancing
- especially enjoyed the dance movements such as *balance, pirouette* and *adagio*
- enjoyed improving their endurance and simultaneously improving their technique and performing skills.

Throughout all the questionnaires and discussions the dancers of the dance aerobic orientated training emphasised three aspects:

1. Dancers need a constant and changing incentive to maintain a high-level of motivation.
2. The running section was both physically and mentally very demanding.

They say that just running is demanding enough but running in a circle with your classmates at your heels 'forces' you to keep going:

- you need to keep running at the required tempo because the whole class depends each persons communal effort
 - you want to keep running because of the competitive feeling.
3. The dancers enjoyed training by dancing. When the initial exhaustion of the programme had given way to more stamina the dancers felt themselves stronger and started working on other aspects (musicality, presentation, technique, spacing, team-work, performance skills). They enjoyed dancing full out for 15 minutes non-stop without being 'interrupted' by teacher's comments. It became their responsibility to cope, to organize, to perfect and to perform.

7.6. Comparison

During the programme three of the dancers switched classes. These dancers had the opportunity of working with both training programmes. One girl started in the dance orientated aerobic programme and switched to the sport aerobic training. Two dancers, a boy and a girl, switched from sport aerobic training to the dance orientated aerobic programme.

Below a selection of their comments:

- To the question "Which training do you prefer"?

"The sport aerobic training is fun to do but the movements quickly become a routine and then it becomes boring. In the dance orientated aerobic training you are dancing; you want to make it look beautiful. You have to think about so many different aspects as well as finishing the training."

One of the students pointed out that in the dance orientated aerobic training you have to

- persevere physically

- keep thinking about the sequences and steps
- listen to the music
- take care of spacing in relation to the rest of the class
- work at presentation
- and continually keep improving your performance.

To the question 'Are both training forms physically equally demanding'?

'The sport aerobic training concentrates on leg movements and the dance orientated aerobic training uses the entire body. Sport aerobic is fun to do because, except for having to finish the training, no demands are made. Dance orientated aerobic training is more difficult because you are continually changing from slow, to fast, to control, to speed. You must be active and alert all the time and besides that, you are motivated by the whole group working together'.

7.7. Boy's comments

Six boys participated in the experiment. Four boys participated in the sport aerobic training. Of the other two boys, one followed the entire dance orientated aerobic programme and the other participated in both programmes; changing class mid-season.

Regardless of training programme the boys generally found the programme too easy and not sufficiently demanding. The boys would like to have more jumps and other forms of fitness as well. The boys suggested additional training with weights and more strengthening exercises.

Summarizing:

- the present training (both sport aerobic and dance orientated) is not sufficiently challenging for the boys
- boys need a longer and more intensive training programme
- jumps, pirouettes and other exciting movements should be included
- boys want exciting, explosive movements
- boys are interested in developing muscles; physical effort
- boys training needs to combine the dance with physically exciting movements
- the boys training can be done simultaneously with the girls; the allegro and pirouettes can, with slight adjustments, be made more challenging.

Furthermore an additional section could be added or the boys could start before the girls (4 x 16 Bars) and then continue together with the girls. There are many creative possibilities to ensure that the boys are continually challenged.

7.8. Maintaining motivation

Endurance training should be done three times a week; regularly timed throughout the week for a long period of time. In this study it became apparent that young dancers, after repeating a set training programme for a certain amount of time, may lose their initial enthusiasm and that training can be a routine. In a positive sense routine can have its benefits, but routine can also

lead to less motivation and training could become an unexciting or even an unwelcome chore to do. The question teachers must answer is, how to keep training from becoming a routine. It is easy to say young dancers need to learn to repeat dance programmes over and over because as a dancer you will be expected to dance the same piece with the same enthusiasm day after day, and in the case of musicals, even years with little or no alterations. There is no denying that this is true and that learning to cope with repetition and learning that with each repetition one should dance as if performing for the first time is a fundamental aspect of a dancer's life. Professional dancers are expected to deal with this but young dancers still need to acquire this skill.

8. Results: comments in questionnaires and suggestions

8.1. Comments in questionnaire November 2005

One of the most mentioned factors leading to less motivation is repetition. Four weeks into the training programme dancers from the **sport aerobic programme** felt that the training was *'always the same'* and that *'the steps are too easy'* and *'I would enjoy it more if we did something else; a surprise'* and *'you continually keep repeating everything. It takes so long'*. After hearing these remarks, from quite a number of dancers, the programme was revised in the hope of making the training programme both interesting to perform and physically more challenging.

At this stage of the experiment, the dancers in the **dance orientated aerobic programme** did not mention the same points as made by dancers of the sport aerobic training. They were more concerned with coping with the training.

Comments include

"The training is exhausting but I already feel some improvement during these first weeks."

"You have to get used to adjusting to new movements and rhythms because you constantly change lines and shapes."

"The running section is exhausting."

"It feels good to do a training."

When asked what they least like about the training, many dancers say that it is tiring and they find the running section especially aggravating.

8.2. Comments in questionnaire December 2006

The second questionnaire revealed that, even though the sport aerobic training had been made more difficult, it was still considered to be too easy and too repetitious. Dancers generally asked more variety in the movements.

All the dancers still felt that the dance orientated aerobic training was still physically challenging. The dancers, who were now coping reasonably with the endurance factor, started to work on the quality and performance. A few dancers mentioned that they would like to have more variety in the form of new steps and combinations. Ten of the twenty-one dancers, who answered the questionnaire, were satisfied with the programme as it stood. Some dancers found too little challenge in repetition, but others thrived on trying to make their dancing more beautiful.

8.3. Comments in questionnaire March 2006

Even though there is a marked difference in the answers between C1 and C2, in the final questionnaire both groups suggested:

- more variety in step and movements
- more difficult steps and movements
- regularly adding and changing new sections
- regularly changing the entire choreography.

One dancer remarked that: "*Repetition leads to boredom and boredom in turn leads to less results*". This is clear language. It became obvious to all teachers concerned, that if the training programme is to be successful the dancers need continual and changing motivation. The whole question of *variety and motivation* is a discussion point for teachers and raises a number of questions.

Suggestions

If the same training is performed thrice weekly there are numerous possibilities:

- introduction of new movements and steps from time to time
- frequently giving an element of surprise (starting with a different leg, changing relationship of groups, changing focus, starting from a different point in the studio etc.)
- giving the training a specific technical/ dance aspect to work on
- changing of purpose e.g. using the training as part of a test class, presenting the training to an audience, performing for parents etc.
- changing the music
- changing the position of the dancer within the 'choreography'.

The training need not always come from the same dance style. At a school where more dance styles are taught you could do three different aerobic training sequences, each derived from a different style. Dance orientated aerobic training is not limited to one dance style. Dance orientated aerobic training may use any style as long as the fundamental principles are maintained.

9. Advantages of a set-structure dance orientated aerobic training

Notwithstanding the feedback given by the dancers, a set dance orientated aerobic programme, performed during the regular dance class, revealed definite advantages:

- a separate warming-up section is not necessary; the dance-class itself functions as warming up
- the dancers know the sequence of the 'choreography' so no time is 'wasted' on explaining (time-saver)
- a set structure ensures a constant physical demand
- basis technique and concepts is constantly being trained
- once the dancers have passed through mere 'survival' stage, they can, with their improved endurance, start concentrating on other aspects (technique, extensions, placement, port de bras, focus, head movement and foot work)
- the 'choreography' becomes more and more challenging as layer upon layer is added: attention to spacing, attention to quality, working musically, working as a unit
- team work and team spirit are essential
- team work and team spirit is being cultivated
- the dancers develop the skill of performing and perfecting the same material over a longer period of time
- presentation and performance skills are trained.

To achieve this process the teacher must continually motivate and give the dancers new incentives.

9.1. Feedback from teachers

The four teachers involved in the programme gave reports during the entire training period. All teachers agree that cardiovascular endurance training is beneficial to the training of young elite dancers.

- * cardiovascular endurance training is stimulating for both dancers and teachers
- * the pupils appear to have more stamina and endurance
- * the dancers learned to push themselves, passing one's own limit and reaching to new goals
- * cardiovascular endurance training should be dance-based. We are working with dance students and their needs are different from those of non-dancers
- * the dance orientated aerobic training can be based on any dance style or in fact a combination of dance styles.

Sport aerobic training

Teachers reported that the dancers found little challenge in the sport aerobic training. The repetitive movements, focussing mostly on the legs and feet, missed the necessary dance element. The teachers felt that the dancers quickly became bored by the endless repetition of similar movements. The muscular patterns trained, the teachers noted, have no relationship to the dance exercises and movements. The training was accompanied by the classroom pianist, who was asked to play an even-timed music to fit the rhythm of the movements. Like the movements, the music is repetitive. Even though the pianist aimed to vary the musical melody, the powerful regular repetitive downbeat tends to be monotonous and consequently uninspiring.

Competition, the teachers report, plays little to no role. The dancers work for themselves. Some dancers 'take it easy' and just go through the motions. Some dancers work hard regardless. Teachers can quickly spot a dancer's motivation. Teachers also noticed certain reoccurring injuries and aches and pains; a number of dancers complained about painful or irritated knees and shins. There is no doubt that sport aerobic training does improve stamina, but teachers felt that there is no relationship between the sport aerobic training and the rest of the dance class. The training is a condition training tucked onto a dance class. One of the teachers, even though she gave the sport aerobic training for the duration of the experiment, felt that it was 'a waste of time' and that she could have achieved the same effect from an aerobically structured dance sequence.

Dance orientated aerobic training

Teachers found the dance orientated aerobic training stimulating for both the dancers and for themselves. It is considered as a positive addition to the class programme giving teachers the opportunity of working at the conditional aspect of training whilst still training technical and artistic aspects. Furthermore, the dancers simultaneously trained other skills: spatial design, teamwork, musicality and performance skills. The dancers enjoyed the competition with each other and as they became stronger more emphasis could be placed on quality and artistry. Dancers also showed an improved core-stability.

The condition training has an interesting side effect. The training takes place within the normal class time. Teachers found that, in order to make time for the training, the pace of class tended to speed-up. Instead of giving explanations or more corrections the dancers were expected to correct with just cues as a reminder. Exercises were kept simple and the dancers were expected to pick up the exercises quickly. All these aspects kept the pace of the class going.

This 'side effect' has its advantages, but also its drawbacks. Both teachers felt that more time was needed to carefully and thoroughly explain complicated aspects of the dance technique. It was difficult to find the necessary time needed to give a detailed explanation or personal correction. Pointe work suffered under the pressure of time.

Teachers needed to continually rethink their teaching programmes aiming to fit in all the necessary elements and this added to their personal workload. Compromises, often, had to be made. It was even more difficult to keep the programme going with impending demonstrations and test classes. Teachers found themselves in conflict, trying to fit in the necessary ballet/dance training next to the dance orientated aerobic training. Both teachers disciplined themselves to continue with the dance orientated aerobic training even though they wished to spend that time on other equally important matters.

Suggestions from teachers

- aerobic training should become part of the regular programme
- the aerobic training should be dance orientated
- the training programme or sections of the programme needs to be constantly revised from time to time
- a dance programme could include classical, modern and character/folklore elements
- a dance programme could be devised to fit in with the monthly goals
(for example; a specific programme based musical rhythms or on spatial design)

- boys need more work and extra stimuli
- each dance style could devise their own programme
- the dancers would have to memorize more, which is itself an additional facet of training.

9.2. Problems encountered

The four teachers involved in the practice-based experiment are enthusiastic about the possibilities of integrating dance orientated aerobic training into the regular dance classes. Nevertheless all teachers encountered various aspects that need further consideration. Teachers pointed out the following points.

Teacher preparation:

- to set a efficient choreographic training requires lengthy teacher preparation
- when different teachers teach the same class extra time is needed for discussion and collaboration.

Classroom:

- actual classroom teaching time is shortened by 45 minutes per week
- there is less time to teach new vocabulary and steps
- there is less time for pointe -work
- there is less time for specific boy's steps and movements
- during training days there is less time for detailed explanations or corrections.

Continuity:

- it is difficult to continue the regularity of the training under the pressures of test classes and demonstrations.

Other:

- it is very demanding for a pianist to play 15 minutes non-stop. It is even more demanding that the pianist must play one continual tempo and avoid any rubato.
- the training can become a routine.

The points mentioned above do not in any way reflect the shared enthusiasm and the positive effect of the integrated endurance training. It does, however, reflect that the endurance training costs a set-amount of time, which cannot be spent on other elements of teaching. All teachers felt that in order to achieve efficient training they had to make concessions to their usual approach to teaching. Sometimes these concessions, in order that there would be no interruption to the continuity of the experiment, were made against their better judgement.

A number of the above points can in all probability, be solved by looking at organization and planning. Other aspects can be eliminated with just a little more time. However, the need to make concessions to the regular training approach is a more tricky observation, inviting discussion to actual teaching approaches on how to pace and structure a ballet/dance class for adolescents.

10. Conclusion

How to efficiently integrate cardiovascular endurance training for young dancers into the regular dance curriculum?

This is a comment made by one of the dancers who participated in both training programmes: *“The sport aerobic training concentrates on leg movements and the dance orientated aerobic training uses the entire body. Sport aerobic is fun to do because, except for having to finish the training, no demands are made. Dance orientated aerobic training is more difficult because you are continually changing from slow, to fast, to control, to speed. You must be active and alert all the time and besides that you are motivated by the whole group working together.”*

Choreography today is a fusion of many dance styles demanding from all dancers speed, vitality, virtuosity and athleticism to the point of acrobatics, flexibility and unrelenting endurance. Today’s dancer must be equipped to dance a large range of styles and techniques, and to cope with the ever more eclectic demands of innovative choreography. Contemporary choreographers, exploring movement to the extreme, require dancers with optimal stamina to be able to perform their choreography and dancer’s require optimal stamina to meet the requirements of the choreographers.

Studies have shown that a fit and healthy dancer is less vulnerable to injury and needs less recovery time if an injury happens to occur. In many ways a fit dancer works less hard than an unfit dancer. The absolute necessity of training endurance is a fact. Understanding the importance of improving stamina dancers go to the gym, cycle, swim or do an aerobic training. These activities are all sport based, often taking place after a heavy day of rehearsal and classes. Why do dancers deem it necessary to train endurance after working physically all day? Apparently there is the lack of aerobic training in today’s dance classes. This observation is the starting point of this research project, which will investigate how cardiovascular endurance training can be integrated into the dance class. It is my conviction that the dance class can contribute to endurance training and dancers and dance teachers need not always resort to the training designed for members of the sport world. The knowledge acquired through sport medicine and science shows the way, but then it is up to the dance teacher to apply this knowledge to dance.

There have been various projects looking at the integration of cardiovascular endurance training into regular dance classes for professional dancers but none, to my knowledge, have looked at the integration of endurance training in the dance classes for young elite dancers who take daily dance classes next to their secondary school training. These youngsters are in the growth spurt, undergoing varying psychological pressures, following a full academic programme, having to do homework and often traveling a long way to and from school.

The young dancers of the future, just as their professional counterparts, need to train endurance. Training outside school is not an option; for most pupils extra training after

school is too time consuming and in all probability too demanding on these young physiques.

As a teacher of these young dancers I was interested in investigating how cardiovascular endurance training can be efficiently integrated into their regular dance classes. The research project involved 45 pupils of the Rotterdamse Dansacademie aged between 12 - 15 years old. They all attend the HAVO VOOR MUZIEK EN DANS, the junior school of CODARTS, University of Professional Arts Education. Two groups of dancers took part in the experiment. The girls were in the majority. Only a hand-full of boys participated. The technical level of their work can be described as elementary.

The research was approached from various angles. Physical aspects, including the occurrence of injuries, were monitored. Dancers were invited, via questionnaires and interviews, to tell their part of the story resulting in diverse psychological and emotional insight. Last but not least, the practical aspects of integrating cardiovascular training into the teaching of an actual dance class were looked into; the teachers were interviewed and asked to give their views and opinions about the process and progress of the entire experiment.

In this experimental research project sport aerobic dance training and dance orientated dance training were compared to ascertain which form of endurance training could be most efficiently integrated into the dance classes of elite young dancers. Sport aerobic dance training is exactly that: familiar to us all from the sport schools. Dance orientated aerobic training is a totally danced training developed from an existing dance technique. It can be developed from most dance styles. For this experiment the dance orientated aerobic training was developed from ballet technique.

To determine whether both sport aerobic training and dance orientated aerobic training have a positive effect on the dancer's stamina and endurance a shuttle run test was held at the beginning and at the conclusion of the training period. Unfortunately the second shuttle run took place after a performance night, so the results do not tell us much about a possible overall improvement. Some individual improvement could be seen, but statistically the changes were not significant. However, on the basis of the shuttle-run results it can be concluded that both types of endurance training were equally effective, since no marked differences could be seen between the sport aerobic training and the dance orientated training.

The dancers were asked if they noticed that endurance training had an effect on their dance classes. Many of the dancers felt that their stamina had improved and that the dance lessons had become easier because they could give a greater physical effort without becoming too tired. Generally the dancers reported that jumping had improved and that it was more fun to do because they could jump longer without becoming exhausted.

To the question if endurance training has had any effect outside of the dance studio many dancers replied that they feel fitter in their day-to-day life. Regardless of training type the young dancers said that they now choose to take the stairs instead of the lift. Likewise they now run to catch a bus or metro when previously they were content with waiting for the next public transport to come along. Some dancers reported that cycling to school these days is easier and they are no longer out of breath on arriving at school. The dancers learned to distribute their energy efficiently in and outside of the classroom and enjoy the pure physicality of movement, feeling fitter and wanting to feel even fitter. An interesting side effect is that a number of dancers, from both training forms, mentioned that they were less tired in the evenings and had more energy to do their homework.

Endurance training has a positive effect on the prevention of injuries. During the course of the experiment dancers became fitter and very few injuries were reported or noticed by the teachers. Both forms of endurance training have a positive effect on minimizing injuries. After four months of regular training, both groups reported a substantial reduction in both injuries and general discomfort. Teachers however reported that a number of the dancers who performed the sport aerobic training complained of pain and discomfort in the lower extremities (shin, calves, knees and ankles). It would appear that sport aerobic dance training is stressful to the lower extremities of fine-tuned dance physiques and to those children passing through the growth spurt. Dancers who participated in the dance orientated aerobic training did not report the same problems. It is not over ambitious to say that the dance orientated aerobic training causes a minimum of physical stress to young elite dancers.

Knowing that both training methods are physically effective the next question is which of the two training programmes is the more efficient in the development of the young dancer? To answer this question, dancers answered various questionnaires, teachers were interviewed and various discussions were held both with dancers and teachers.

Sport aerobic dance training is an effective endurance training. The elite young dancers, however, found the training insufficiently challenging. The young dancers want to dance; the movements of sport aerobic are limited, concentrating mainly on foot and leg work. The training cannot sustain long-term interest. Dancers found sport aerobics too repetitious and after the initial fun has worn off the movements offer very little challenge. Various dancers were very candid saying that you could easily give the impression you were working by simply following the general trend of the group. The teachers felt that the dancers quickly became bored by the endless repetition of similar movements. Likewise the music, a regular downward beat was found to be uninspiring by dancers and teachers alike.

The muscular patterns used have little relationship to the dance exercises and movements. Sport aerobic dance training trains neural patterns that are not readily used or even foreign to dance training. Furthermore the training lacks the subtlety and dynamic diversity, both muscularly and musicality, so inherent to the art of dance. The dancers

considered sport aerobic training to be a very individual process. They feel that competition plays no role or, at the very most, a minor role. Sport aerobic training is considered by the teachers and many of the dancers as a separate section of the class, 'stuck on' as it were without connecting to the rest of the dance class.

Dance orientated aerobic training has proved itself to be an efficient form of endurance training. It is directly linked to dance training, using steps and movements previously learnt in a non-stop choreographic sequence. This link is all the more consolidated, because dance based muscular patterns are practised and the entire choreographic training sequence relates continually to the concepts and principles of the dance lesson. Dance orientated aerobic training is a multi-functional training complimenting dance training as a whole. Whilst training endurance, dance orientated aerobic training trains and consolidates technique, trains coordination, trains spacing skills, demands musicality and teamwork as well as performing skills. The training develops the dancer's alertness and independence. Competition plays a vital role: many of the dancers thrive on the competitive spirit of the group as a whole. Dancers help each other to continue, often crossing endurance barriers they had not thought possible, which not only improves their stamina but also has a positive effect on their self-esteem.

Young dancers enjoy dancing. Dance orientated aerobic training allows them to do just that by utilizing a combination of movement phrases which the dancers would normally perform as classroom exercises. For most of the dancers the training remained challenging throughout the entire course of the experiment, because new and different focus points were continually being addressed. The dancers pass through an entire process: from physically trying to complete the training, to improving the technical aspects to focussing on musicality, spatial design, presentation and then developing the training into a performance. Dance orientated training is a non-stop choreography which could be and should be performed in public. Physically the training has proved challenging but the dancers retain their motivation because they feel that their endurance is improving and they enjoy the sheer fun of dancing. The dancers love dancing full out without the usual classroom interruption of stopping, correcting and waiting. The dancers take responsibility for their own fitness because they feel stronger in their technique classes and understand that fitness is beneficial for their health and vocational training.

Regardless of training programme the boys generally found the programme too easy and not sufficiently demanding. Boys need a longer and more intensive training programme that includes exciting and explosive jumps. The boys training can be done simultaneously with the girls, but more physical demands need to be made to ensure that the boys are continually challenged. The training needs to be longer than that of the girls and contain more jumps and turns. This could be a good opportunity to allow the boys to experiment with more advanced material.

The endurance training programme is performed three times a week and takes at least fifteen minutes of classroom time. The programme is devised so that many technical and dance issues are being addressed in the course of the training itself. In this way steps,

movements and dance skills are performed in the training programme and need not be practised separately in class. This gives the teacher time in class to deal with the matters at hand.

Nevertheless the teachers, even though they are enthusiastic about the possibilities of integrating dance orientated aerobic training into the regular dance classes, felt that the training costs them valuable classroom time. Teachers noticed they had too little time to teach new vocabulary and steps. Likewise they felt rushed when giving detailed corrections or explanations. Pointe-work and boy's work suffered. This time pressure was especially felt when test classes and demonstrations were being prepared. These comments invite a discussion on how to pace and structure a dance class for young vocational students.

Furthermore, to ensure that the training programme achieves optimal results teachers feel the need to regularly discuss the progress of the training. This is even more pressing when two of three teachers teach the same class and are jointly responsible for the endurance training.

Endurance training must be performed regularly over a long period of time. In both training forms there is always the danger that the training may become a routine. For most of the young dancers who participated in this study, the sport aerobic training quickly became a routine, lacking the physical and artistic challenge that these dancers needed. Dance orientated aerobic training can of course become a routine. Some dancers suggested that new dance phrases should be regularly added. Most of the dancers however did not experience the training as a routine, they enjoyed working towards a realistic goal. The role of the dance teacher cannot be underestimated, playing a vital role in maintaining the student's motivation. It is the task of the teacher to give the dancers various and changing incentives so that the dance orientated aerobic programme does not become a repetitive routine, but that the very routine becomes the basis to develop many skills.

Endurance training is an essential part of training today's dancers if we are too 'prepare dancers for a career with no boundaries' (5). This experiment has shown that endurance training for young dancers can be successfully integrated into the regular dance classes. Sport aerobic training limits itself to endurance training and is therefore inefficient in the process of dance training as a whole. For elite young dancers the dance orientated aerobic training is the more efficient form, training endurance whilst simultaneously training a multitude of other dance skills and addressing psychological issues pertinent to the adolescent dancer. It is a multi- functional endurance training programme that relates directly to the requirements of dance training, to the dance aspirations of young dancers and to dance as an art form.

11. Implementation

"Dancers are not training to run marathons but to increase stamina in class and performance."
Gigi Berardi in chapter 4 'The Fit Dancer'

July 2006

At the final teachers meeting of the year the HAVO teachers took the opportunity to discuss the results and conclusions of the research project. All teachers present agreed that cardiovascular training is a vital aspect of today's training. After presenting and discussing the conclusions the entire HAVO team decided that:

- cardiovascular training should be integrated in the curriculum
- that cardiovascular training could be a part of the dance class
- that dance orientated aerobic training is preferred above sport aerobic training

It was decided to meet again at the beginning of the new season to make definite plan.

August 2006

After an extended presentation of the entire experiment followed by DVD presentation of the students comments, the teachers present set to work to plan the implementation of the cardiovascular dance orientated training programme:

- the programme will be set for all classes before the autumn holidays
- that cardiovascular training is especially beneficial during the rehearsal period ensuring that dancers rehearsing for the performance retain their stamina and endurance.
- all pupils will answer a questionnaire, about injuries, prior to beginning the training programme
- the programme will be supervised throughout the year by Yvonne Beumkes
- Yvonne, herself also one of the teachers teaching the training programme, will keep close contact with all the HAVO teachers discussing both progress and findings. She will be the contact person for all questions and problems relating to the training programme.

September 2006

Various teachers, from different disciplines, had started to prepare a dance orientated aerobic training programme. Different classes had started the training.

The progress of HAVO training programme will be followed by Yvonne Beumkes and become the basis for a new research project looking into:

- the practical implementation of dance orientated aerobic training in the HAVO
- if and how young dancers can retain their motivation for endurance training over a long period of time
- how to adapt the dance orientated aerobic training to continually challenge the boys and young men
- is dance orientated aerobic training a useful tool to maintain stamina during the rehearsal period prior to the end of the year performance?
- endurance training for adolescents at other, both national and international, professional dance institutes.

12. Questions for further study

1. How to avoid that the dance orientated aerobic programme becomes a repetitive routine and ensure that the very routine becomes the basis to develop many skills?

Routine can have a positive effect on the dancer's training. Routine, used well, is a skill. Routine in a negative sense can lead to disinterest. Training requires a certain amount of repetition. Does a training programme need to change regularly or should dancers discipline themselves in order to perfect a training sequence to become choreography? To counteract the possible negativity of routine suggestions have been made to regularly change the steps and movements of the training sequence. Dancers suggested more variety of steps and regular changes. Working with these young dancers I asked myself if changing the steps regularly is indeed the only or ideal way to approach this question. Is it not just this sheer repetition that builds up the dancer's stamina? If the steps are changed too often then the dancer temporarily loses the benefits of routine and in the time needed to regain that very routine the aerobic effect diminishes. Of course changes may be made and are indeed advisable. The question is how and how often? Some questions:

- what is the effect of routine in dance orientated aerobic training ?
- how can dancers stay motivated?
- how, when and which changes should be made?

2. Is a standard dance orientated aerobic programme effective for all body types?

There is no standard young dancer; dancers during in their puberty undergo both physiological and psychological changes. Teachers noticed that, in the course of the research project, dancers with a natural low muscle tone showed little physical improvement even if those dancers showed great motivation and perseverance. Further questions are:

- is a standard endurance programme training effective for young dancers with a low muscle tone?
- is a standard dance orientated aerobic programme effective for all body types?
- can the programme be adjusted to meet the specific requirements of specific groups?
- which considerations should be made for dancers in the growth spurt?

3. How to continually challenge boys in a class full of girls?

Boys need to be challenged physically. The boys participating in this research project generally found the training programme too easy and not sufficiently demanding. The boys would like to have more jumps and other forms of fitness as well. Boys need a more intensive training programme with exciting and explosive movements. A boys training needs to combine the dance with physically exciting movements. Ways need to be found to keep challenging the boys within the time limit of the standard training.

4. How can dance orientated aerobic training effect the pace and structure of the dance class?

Performing the training during normal classroom time presented an interesting side effect. Teachers found that, in order to make time for the training, the pace of class tended to speed-up. Instead of giving explanations or more corrections the dancers were expected to correct with just cues as a reminder. Exercises were kept simple and the dancers were expected to pick up the exercises quickly. This 'side effect' has its advantages but also its drawbacks. Teachers found it difficult to find the necessary time needed to give a detailed explanation or personal correction. They continually needed to rethink their teaching programmes aiming to fit in all the necessary elements. This added to their personal workload. These findings invite a discussion on how to pace and structure a dance class for young vocational students.

13. Some background information on the importance of fitness for dancers

In the last decade sports science has made a considerable contribution into many facets of dance training. In 1996 Dance U.K., in their report *Fit to Dance?*, stunned the dance world with the news that professionally trained dancers are no fitter than the average citizen. Dance companies and schools, suddenly aware of the importance of cardiovascular training reassessed their programmes to incorporate fitness training. A fitter dancer is less prone to injury and more equipped to cope with the great diversity of demands made by contemporary choreography.

In the course of 20th century the dancer has transformed into a dance athlete. Today's dancer looks athletic, is acrobatically supple, is required to have enormous extensions, must be strong, virtuous and requires unrelenting stamina. The contemporary dancer is expected to be able to adapt to various styles ranging from the classics to the most exploratory modern choreographers. All dancers today work with choreographers who explore the full range of human motion, not to mention those who challenge their dancer's endurance, even to the point of exhaustion. I have seen pieces where dancers perform constantly, in different degrees of vigour, for more than an hour non-stop. The dancer of the 21st century is a versatile dancer trained to cope and adapt to innovative demands of choreography. The demands made on dancers today are immense. During the 1999 dance conference "Not Just Any Body" panellists, in a discussion on how to prepare dancers to meet the demands of today's choreography, raised a most pertinent question; one that must inspire dance teachers world over: *"How do you prepare dancers for a dance career with no boundaries?"* (5)

Over the last decade, reacting on Dance U.K.'s findings and other research projects, I have observed the tendency of professional schools to incorporate physical sport training into the dance curriculum. Cardiovascular endurance training has appeared in many school programmes. In some instances aerobic dance training is substituted for the traditional ballet class or dance training. Other schools advise extra curriculum running, swimming or cycling.

These developments raise a number of questions:

- is sport orientated condition training the right choice for dancers?
- is aerobic-dance training the right choice for dancers?
- how does non-dance movement training effect the dancer's musculature?
- should dancers do endurance training in addition to their already heavy schedules?
- are dancers at higher risk performing exercises foreign to their normal training?
- are sport based exercises functional for dancers?

Writing about dance training for young elite dancers, Maria Fay explains the complexity of the demands made upon the young dancer. She points out the similarities but also the difference in the training of dancers and other physical activities such as athletics and gymnastics.

"To find out what differentiates a young dancer from any other arts student we have to remind ourselves of the often-mentioned circumstance that the instrument of our art form is our own body. We not only have to learn to play on this complicated instrument but we also have to shape and change it. It is as if a pianist needs to alter the configuration of the piano upon which he or she will play. Our situation becomes even more complicated because it isn't enough for us to make the body strong, we must, at the same time, finely tune it to perform innumerable complex movements, which are totally alien for a normal human being. Athletes, acrobats and gymnasts have to do the same though in most cases their movement vocabulary is much more limited. Naturally, the preparation of their bodies can be more restricted. In a dancer's case immense care must be taken. Besides achieving muscular strength, flexibility and stamina, the body, or in other words the instrument, should be transformed and sculpted into a very specific object of beauty." (6)

Various scientific studies have shown that dancers require more aerobic endurance training, which could help to avoid injuries and help the dancer to maintain a greater working capability to meet with the increasingly raising demands of today's choreography. The forms of exercise generally suggested to achieve cardiovascular endurance are jogging, swimming, biking and aerobic dance. These activities have little or no physical or artistic connection with dance training. As a ballet teacher with more than 30 years experience I feel that the ballet class/dance class can provide a great deal of the necessary condition training.

In his article, 'The structure and pace of a ballet class', renowned ballet teacher Richard Glasstone points out: *"I have been involved in classical ballet for almost fifty years.... .In that time, I have observed a gradual erosion of the sense of balance in the structure of so many classes.....This usually starts with a seemingly endless prolonging of the time spent at the barre- nowadays a universal fault..... and the price paid for spending too much time at the barre is that other areas of the class are given short shrift."* (7)

In another article 'Dance Injuries: a teacher's view', Glasstone discusses if in fact there is a need for all types of fitness training to supplement the daily ballet class. He stresses: *"If teachers interrupted the natural flow and pace of class - and especially that of barre-work- less often, either with long explanations of complex choreographic sequences, or with interminable over-analysis, the dancers would build up the stamina they need for their work. In this respect it is essential to differentiate between class, which should be paced to build stamina and a coaching session, during which movements can be dissected at leisure - two very different aspects of training."* (8)

Richard Glasstone's teaching is inspired by Enrico Cecchetti. In a traditional Cecchetti based class, the barre work is a series of well-known exercises, each successive exercise developing physical, dynamical and rhythmical qualities. The barre work takes approximately 15 minutes followed by *exercices au milieu*, a development of barre exercises now performed in the centre demanding an even greater attention to core stability, balance and coordination. Within 30 minutes the body has been thoroughly warmed,

muscular activity has been trained and dynamics, musicality, alignment, placement, balance have been totally interwoven in the exercises. The remainder of the class is reserved for various types of adagio, pirouettes and many different types of allegro. Most of the exercises and enchaînements are known to the dancers so that very little time is needed for explanation.

In the past years I have attended seminars given by David Howard and was present at quite a number of his classes. The barre exercises he gives are relatively simple and clear in purpose, requiring just a moment to explain. Port de Bras and stretching are set; they contain no complexities so that guest dancers can easily follow the other dancers. I timed the length of his barre-work. Within 35 minutes the barre (including stretching) was completed, leaving near on an hour for centre work. Howard corrections are swift and to the point. The structure of exercise itself, he emphasizes, is teaching the dancer. In the classes where I was present, one exercise flowed into the other and dancers were given many opportunities to attempt a step or combination. Howard tends to continually clap with the rhythm of the music 'because there on the spot you feel you can drive them (*the dancers*) sometimes, and at other times it just seems really necessary to clap to keep the energy level up' (9). Dancer Cynthia Harvey comments: "*David's class is the most aerobic class I know of.*" (10)

Eileen Wanke, herself a classically trained dancer, now surgeon has done extensive research into the field of dance medicine. During the 1999 Not Just Any Body conference she explained her ideas about applying the principles of sport condition training into the ballet class. She is cautious about the effects of sport condition training and proposes a dance specific endurance training. Wanke, while explaining her ideas at the 1999 'Not Just Any Body Conference', adds: (11) "*It cannot be excluded that non-dance specific endurance training such as swimming, cycling or running affects muscle flexibility over the years and develops unwanted muscles, particularly in the upper thighs. Furthermore, it is difficult to add endurance traditional training to the daily demands of dance. Integrating endurance training in daily training, however, offers the possibility to enhance physical capability in a dance-specific way.*"

I attended a workshop in November 2000 on *Endurance Training in the Dance Class* given by Eileen Wanke. She explained that in a normal ballet class dancers wait for fifty percent of the time; watching the teacher demonstrate, correct, waiting whilst the other group is dancing, waiting for your turn on the diagonal. Furthermore exercises can be relatively short followed by 3-4 minute wait. Wanke suggested modifying the class to minimize breaks between the exercises. To achieve this, a set class should be set and dancers could perform this class practically non-stop, ideally non-stop, until the petit allegro. This would give an endurance training about 40 minutes. The class should be repeated three times a week. Wanke had tested her training programme in a dance company for some time. Dancers considered themselves physically fitter at the end of this study. They found rehearsals and performances less exhausting and less physically demanding.

The New York City Ballet has devised an exercise programme that combines the elements of ballet training together with athletic conditioning. *"Given the increased popularity of exercise systems such as Yoga and Pilates",* informs Rebecca Metzger one of the pioneer team of the New York City Workout, *'there can be little doubt that people have increasingly become aware of the benefits of adopting a more holistic attitude towards keeping fit. Growing demand for these techniques, however, has also served to underline the difference in approach taken by the more traditional aerobic-style workouts.'* (12)

Peter Martins found that the traditional condition training was not teaching participants how to work their entire body to maximum efficiency. To this end he developed the idea of creating a workout, based on ballet exercises such as those used in the New York City Ballet Company to maintain fitness, grace and athleticism. Though this programme, devised by dance and sport specialists, is not primarily a cardiovascular condition training it does show how ballet exercises can be integrated into the vision of sports condition training.

Internet offers a multitude of fitness programmes suitable for dancers, gymnasts, acrobats and sportsmen. Fitness is big business. Fitness is in and commercial. Just one glance at the internet is enough to see the different DVD's available; each one promising to be the ultimate in fitness training. Dancers and dance teachers need to work with fitness training in an efficient and holistic way. Perhaps we need to consider

- is there a lack of aerobic training in today's ballet/ dance classes?
- how can cardiovascular training be incorporated into the dance class?

The above points made, for the most part, are about the training of professional dancers and older dance students. Only Maria Fay talks about the young elite dancer. My specific interest lies in the training of cardiovascular endurance within the dance class for adolescents. I feel that stamina can be trained within the dance class and developed from dance material. I have found very little information about a dance orientated endurance training for dancers in their early years of training. Some vocational schools, however, have taken fitness training into their programmes. I witnessed a fabulous swimming training, at The National Ballet School of Canada (Toronto), where young dancers worked together performing all types of movements, including dance movements, in the water. At the Royal Ballet School (London) 11 year olds are being given conditional exercises to help enhance the dancer's general fitness. Likewise, Rachel-Anne Rist, director of Dance at the Arts Educational School (Tring, UK) has developed a fitness programme advocating that young dancers should do body conditioning and fitness training, and, most especially during the growth spurt. She advises swimming or cycling but not running (13).

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