

# THE BADMINTON ASSOCIATION OF ENGLAND MISSION STATEMENT



## ***Badminton is an Olympic Sport***

*It is played by groups, families and individuals of all ages and it provides a healthy, lifelong sport activity that is easily accessible to all regardless of race, gender or ability.*

*Our mission is to ensure that badminton is recognised as a major, national competitive sport providing a full range of opportunities to those who wish to play.*

## Fitness training in Badminton

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# **Fitness training in Badminton**

This booklet is intended to be used a resource for students and young players with a view to increasing understanding of badminton fitness training. Many of the examples given are intended for those who are serious about improving the standard of their game – especially developing juniors. However, it is hoped that all readers would further their knowledge and benefit from reading this information.

The Badminton Association of England accept no liability or responsibility whatsoever for any injury or illness sustained through the use of exercises and information contained in this or any document.

## ***Introduction to the game***

Badminton is an extremely demanding sport. At an elite level, players are often required to perform at their limits of speed, agility, flexibility, endurance and strength. On top of all of this, players must maintain a high state of concentration in order to meet the tactical / mental demands of dealing with their opponents. The varied potential stresses of competitive play are considerable. It is therefore essential that everyone involved with the modern game ought to be familiar with the fitness (physiological) requirements of the game and how ‘Badminton fitness’ can be enhanced.

### Physiological ‘description’ of the sport

Badminton is a highly complex sport and this presents great challenges for players and coaches of all levels. An individual rally is a series of demanding movements performed using a movement pattern which is unique compared with any other sport. Rally length is often short (average for elite players is around 6-8seconds) and, consequently, performed at very high intensity. However, players must also be prepared for long rallies. Rallies are interspersed with short rest periods (typical duration around 15 seconds) which allow partial recovery from the previous rally. However, competitive matches may last at least 45 minutes. So, badminton is a combination of speed (anaerobic fitness) in rallies and endurance (aerobic fitness) to allow sustained efforts and to promote recovery between rallies. Great strength, power, agility and flexibility are also required. All of these fitness components should form part of a player’s fitness training. Additionally, the development of tactical and technical elements is, of course, also vital. With all of these types of training, an understanding of the principles of fitness training from a general point of view is essential.

## ***General principles of fitness training***

### **Specificity**

From a simple point of view, specificity of training refers to whether training is *relevant*. For example, power training for a javelin thrower is likely to require very different routines to those which would be used for badminton players. Relevant power training for Badminton would simulate some of the movements which are experienced on the court. An example would be the use of lunges for strength development. Because this movement is so important to badminton, training with lunges is very specific and therefore more effective than general techniques.



*Lunges off court*



*Lunges on court*

Specificity extends to all areas of fitness training. A knowledge of the typical rally length and recovery length should be used in the development of specific training. If players only ever trained for work periods of 30 seconds or more, this type of training could be judged to be non-specific because most rallies are much shorter than this. The human body is amazingly adaptable but it can only adapt in response to the stresses it is exposed to.

## **Progression**

The whole purpose of good training is to expose the player to situations where the body's physical limits are gradually being extended. For example, an athlete wishing to complete a marathon would have to gradually extend the distance covered in training sessions. Gradually over a matter of weeks a session which was hard will become easier and the distance or the intensity (i.e., speed) will have to be increased for the training programme to continue to be effective in promoting improved fitness. The same is, of course, true in Badminton.

When a given kind of training is introduced for the first time, it is important that the training is initially fairly easy for the player to perform. With experience, the training must 'progress'. In fitness training, this means that the stimulus to improve fitness is slowly increased so that fitness improves gradually from one stage to the next. Progression is an essential element of a successful training programme.

Example – off court session to improve aerobic fitness (low initial fitness level).  
One session per week

- Weeks 1-3.  
20 minute continuous jog at an easy pace. Aim: to complete run without stopping
- Weeks 4-6  
30 minute continuous jog at easy pace. Aim: as above (but 30min)
- Weeks 7-9  
~ 25 minute run at moderate pace. Aim: same route as week 4-6 but at a faster pace
- Weeks 10-12  
35 minute continuous run at similar pace as in weeks 7-9.

This plan shows progression for both the duration and for the intensity of the exercise.

Only once a programme of training can incorporate progression in some form can true improvements be evident. Progression must be gradual, however. Excessive increases in the demands of training will bring about excessive fatigue and increase the risk of injury. This will ultimately be counter-productive. It is impossible to judge generally the rate of 'ideal overload' for any given player. But with well-documented training and a professional approach a coach and player will soon begin to learn the player's capabilities.

## Variation

Training needs to be varied in order to enhance both physical and psychological development. There are a number of general physical requirements of a badminton player. For example; speed, strength, endurance, flexibility. While these should all be developed specifically, it is also beneficial if there is some general development of these components as well. Some players like to go running for endurance fitness but overuse injuries can result from a lack of variation in training. It would be preferable if endurance work could be performed using a range of training activities (e.g., swimming, cycling, running and other sports).

The principle should also be applied to on-court situations. Technically, if a certain skill is developed using a range of drills, then there is a greater likelihood that it can be applied to new, unexpected situations. If a player needs to increase movement speed, then that needs to be achieved in many varied circumstances on and off the court. Clearly on-court speed is vital for the sport but general development of speed off the court will also transfer onto the court if movement technique is good.

Example – on court sessions to improve movement speed (moderate initial fitness level)

Drill 1 – Shuttle runs across the width of one court & back to start point. Perform 3 repetitions in succession and repeat 10 times with 45 seconds between each effort.

Drill 2 – Shadow play from service return position. Net shot, back to play clear, come back to net to play kill. Repeat 12 times with 25 seconds between each effort.

Drill 3 – Multifeed\* 15 shuttles random movements. Repeat 8 times with 40 seconds between each effort. All drills to be performed at maximal speed.

These sessions show variation as they use non-specific movements (drill 1), specific movements without a shuttle (drill 2) and specific movements with a shuttle (drill 3).



*Shadow play*

\* Multifeed is where a coach or feeder hits or throws a shuttle, one after another, for the players to return.

## ***Training techniques for Badminton***

The type of training used by badminton players is generally related to the standard of the player. For younger players with less well-developed skill levels, most training is likely to be devoted to playing games. With higher skill levels should come greater dedication to the game and increased use of the many potential types of training that will help competitive performance.

Simply, Badminton training can be initially categorised into on-court and off-court work. On-court work would mean training with badminton movements with a racket and usually (although not always) with a shuttle. Off-court work is usually additional work that has the aim of enhancing some particular aspect of fitness. After an initial section of warm up and warm down, the purpose of this section is to outline types of training, while a later section will give examples of how these techniques can be used to enhanced fitness.

### **Warm up & warm down**

Any exercise is a considerable stress on the human body and the body should be given time to adapt to exercise and also to recover from exercise. Warm-up and warm-down are similar in principle and similar exercises can mostly be used for both purposes. Warm-up and warm-down are easily ignored as they may not appear to have a direct bearing on the training session in hand but both elements should be part of every training session and time should be allocated (at least 10 minutes each) to allow this to happen.

A warm-up has psychological and physiological goals. Firstly, it should involve dynamic movements that help to increase body temperature. This is initially achieved by general activity such as gentle jogging for around five minutes. Secondly, it should involve some stretching which will help to prepare the muscles for the stresses ahead. After jogging, some stretching should be performed. This should particularly concentrate on muscles that are to be used in the activity. Stretching in a warm-up should involve some dynamic flexibility work– i.e., movements through a complete range of motion. Finally, warm-up has psychological advantages as it should allow the player to mentally prepare for subsequent training or competition.

Warm-down is the opposite of warm-up and is performed after completion of an exercise session. The purpose of warm down is to maintain a slightly elevated metabolism which will help to promote recovery from the exercise that has just taken place. Moderate intensity activity is an excellent way to promote recovery of previously active muscle so a few minutes jogging is to be recommended after completion of a session. Like warm-up, this should also be followed by some stretching. Stretching after exercise is not as common a practice as it should be. This is a very important way to further promote the recovery from exercise and to help reduce injury risk.

## Examples of on-court fitness training types

### Games

Playing games will nearly always have some fitness benefit as well as the obvious technical and tactical benefits. But it should be appreciated that sole use of games will not be effective in promoting one specific area of fitness.

*A fairly high proportion of training should be focused on games, especially in the weeks before a major event*

### 'Shadow play' (i.e., Badminton without a shuttle!)

Because shadow play is not concerned with the outcome of a shot, shadow movement routines are often used to work on footwork or fitness.

*Example to enhance movement speed (suitable for all levels)*

*Players are required to move around the court for ten seconds at their maximum speed. This is then followed by around 40-50 seconds recovery. This routine can be repeated for 10 – 20 minutes.*

### Multifeed

A feeder begins with many shuttles, ready to hit or throw ("feed") them to a player. Shuttles are quickly directed to different positions around the court. Like shadow play, multifeed routines can be used to stress many different aspects of fitness (and other requirements for the game, generally)

*Example to enhance speed / endurance (suitable for highly trained players)*

*Feeder feeds 30 shuttles to random positions around the court. Player must return each shuttle before moving straight onto the next shuttle. A 30-second recovery is given before the next set of 30 shuttles is fed. Such a routine would be extremely hard, if done correctly, and it is unlikely for such a routine to last more than 10 – 15 minutes.*



*Multifeed session for singles players*



### Conditioned games

A variation on standard games. Conditioned games may be used to stress certain aspects which need to be worked upon in training.

#### *Example to enhance on-court endurance*

*Rally length could be artificially lengthened by making players hit 10 shots each before playing out the point in the usual way. This could be an effective way of improving specific Badminton endurance and consistency of shot production.*

### Conditioned drills

This would be any drill with a specific aim using principles not covered already. Such drills would be more specific than shadow play or multifeed work but less specific than a conditioned game mentioned above.

#### *Example to enhance movement speed in singles player (advanced) 2 v 1.*

*One player plays rallies against two players on the other side of the net. The two players usually cover half a court each playing 'side by side'. The lone player will be forced to move more quickly in this condition. Such a session with three players could involve rotation of players playing alone against the pair.*



*Singles player 2 v 1*

## **Examples of off-court types of fitness training**

### Strength Training

The purpose of weight training is usually to increase muscle strength. In order to achieve successful strength gains, specific muscles must perform movements while working against a resistance. Weight training is a skill and, like all skills, development of optimal strength for a player may take a very long time (often a matter of years). Players should start with light resistances so that they become skilled at the movements required (qualified instructors should be used for this purpose). Once a movement is learned (this may take at least 8-10 sessions), the resistance can be increased so that real strength development can commence.

Sufficient strength is vital for many aspects of successful Badminton play. A strong player is likely to move more quickly and powerfully and is also likely to hit harder. Effective strength training will lead to a player having greater control of movement. Strength training is also very effective in overcoming imbalances in muscle strength. Badminton is an asymmetrical sport and this can cause unequal muscle strength. Such imbalances are not uncommon and may lead to imbalances in movement style and then go on to cause injury. Good muscle strength will also help to protect joints and, thus reduce the risk of injuries. At international level, all elite players perform strength training and the benefits are also likely to transfer to players of a lower level of ability. One common concern about weight training is that it will cause excessive increase in muscle mass ('bulking up'). This is extremely unlikely to occur if a player is performing an otherwise well-rounded Badminton training programme.

Weight training should only be undertaken under the supervision of qualified instructors. Players who are still growing should not normally undertake weight training.

### Aerobic training

The purpose of aerobic training is to develop the ability to transport oxygen and food energy around the body (i.e., cardiovascular fitness). Aerobic activity is quite simply any exercise that raises the heart rate significantly for fairly prolonged periods of time. Badminton itself is an aerobic activity and using games as aerobic training is totally acceptable. However, aerobic training should also be done away from the court. Any activity which uses large muscles (e.g., legs, arms) will help aerobic fitness provided that total exercise duration is above about 20 minutes. Suitable activities would include running, swimming cycling and many fitness classes.

Aerobic (or endurance) fitness is essential for Badminton. Aerobic exercise involves the heart & lungs transporting oxygen and food energy to the working muscles. These help to promote recovery from exercise as well as restoring muscle energy supplies for the next bout of activity. A player with good aerobic fitness will be able to play very hard without getting as tired as a less-fit opponent. Once a player is tired then mistakes will become more frequent and, as a consequence, aerobic fitness is likely to be closely related to success in long games. Good aerobic fitness is also likely to mean a player can do more training over prolonged periods of time. In this way aerobic fitness, like strength, underlies all training activities. A common concern about endurance training is that it will cause a player to become slow. This is because continuous endurance training is usually performed at fairly low intensity (i.e., a speed that can be continued for 30 minutes). A lot of continuous endurance training could certainly detract from speed and agility but appropriate endurance training (detailed later) should involve a range of activities and training intensities and should not result in decreased movement speed.

### Speed & Agility Training

Speed and agility are quite closely linked to strength. Speed, in particular is usually improved when strength and power are enhanced. Both speed and agility are vital to Badminton performance. A successful player must move quickly when necessary but changes in direction are equally important in the game due to the nature of the movements required in a rally. While some people seem to be naturally fast and agile, these are both skills that can be acquired. It is important to remember that speed and agility will not be improved if a player is training while tired. Speed and agility must be trained when a player is relatively fresh, but after a good warm up.

### Flexibility Training

This is essential for our sport and good flexibility is both a requirement for success in the sport but is also likely to be related to a reduced risk of getting injured. Flexibility training involves stretching a joint through its whole range of motion. This can be done using slow movements where a stretch is held for a period of time up to 30 seconds. This kind of stretching ("static") is performed at the limit of a muscle's range of motion. Alternatively, flexibility can also be performed using dynamic movements. Both of these types of flexibility training should be incorporated into every player's regular training schedule.

### Core Stability Training

Core stability refers to strength of the postural muscles in the torso. These muscles help to stabilise the spine, pelvis and shoulders. Although these areas may not appear to be directly responsible for dynamic movements in badminton, strength here promotes effective movements in connected areas (i.e., arms, lower body). A 'strong core' can be likened to the foundations of a house. If the core strength is good then the quality and power of other movements in the arms, trunk and legs will be increased. Core stability training will help to promote overall balance and muscle control as well as reducing injury risk and muscle imbalances. The training procedures for core stability usually involve slow, often static, muscle contractions which may involve some use of additional equipment such as gym balls. Muscular contraction with an emphasis on control is the key to successful core stability training.

### Circuit Training

Circuit training is a general term used that describes training where different exercises are performed at high intensity for quite short periods, followed by quite short rest periods. Circuit training is excellent for badminton fitness as it can be used to increase muscle strength, endurance and aerobic fitness. Circuit training can be performed using weight training exercises or by using one's own body weight to create a resistance. Additionally, movement drills (sprints, shadow play etc.) could be adapted to form a part or the whole of a circuit training session. Typical work duration would be 30 seconds, with an intervening rest period of 30 seconds. With a range of exercises (jumps, sprints, court drills, weights, sit-ups, press-ups) many different activities can be performed one after the other to form a whole circuit training session which could last around 20 minutes or more.

## ***Development of specific fitness components***

The purpose of the many types of training used in badminton has already been discussed. This last section will give you specific details of how to convert this knowledge into real training sessions like those which are performed by elite players.

### Aerobic Training

The key to successful endurance training is to use varied training in terms of the intensity and duration of sessions performed. The following is a list of four contrasting types of aerobic training sessions. Each of these are valuable in their own way and a well-rounded aerobic fitness will be developed by incorporating all of these types of sessions into a training programme

#### **Duration**

- 35 minute continuous run / swim / cycle at a moderate intensity

#### **Long interval**

- 5 repetitions of 4 mins. hard running followed by 3 mins. of easy jogging

*written as '5 x (4 min hard : 3 minutes easy)'*

#### **Medium interval**

- 4 sets of (5 x (40sec hard : 120 sec walk)), 2 additional minutes rest after each set

#### **Short interval**

- 5 sets (4 x (10 second sprint: 30 second walk) 2 minutes rest after each set

These suggestions above are only to be used as a guide and it is fine to use the same principles when planning a session with other activities such as swimming, cycling, rowing, etc. The principles of variation, specificity and progression should be considered when incorporating these types of training into a whole programme.

The 'duration' type of session is to be used mostly away from competition time as it involves slow, repetitive movements. However, duration training is very good as a foundation for the other, more intense sessions. In contrast, the short interval session should mostly be used near to competition time as it is aerobic but also involves fast, short movements.

### Strength Training

Strength training is best optimised with 3-4 sets of 4-8 repetitions. The recovery between each set should be about 120 sec. Strength training sessions should generally be performed up to three times per week. True strength gains are unlikely unless training is performed at least twice a week. Once a player has become accustomed to performing the strength training movement appropriately, it should be ensured that weights are selected which cause fatigue after the required number of repetitions (in this case between 4 and 8 reps). The subsequent 2 minute recovery should be enough to allow the same (or similar) number of repetitions to be lifted.

There are thousands of exercises that target different muscle groups. The programme should consist of both badminton specific and general exercises. Valuable exercises for badminton would include:-

Rotator cuff, Seated row, Lunges, Squats, Calf raises, Tricep press, Dumbbell flies

It is preferable to use free weights (bars, dumbbells, etc.) as opposed to machine weights as the adaptations to free weight- training exercises are more functional to sporting performance. Correct movement technique is essential for appropriate strength development without injury risk. However, it is beyond the scope of this booklet to instruct on the technique of specific exercises: **qualified instructors should be used for this purpose.**

### Power Training

Power is the application of strength at speed. Power can be developed initially using the same kinds of movements used in strength training. This is best trained with exercises that use a number of muscles at a moderate resistance with fairly high movement speed. Olympic lifts such as power cleans best suit this type of development. A progressive overload is essential, and like strength training (above) you should never sacrifice technique.

Power can also be developed using body weight as the resistance to work against. Exercises like explosive jumps and sprint drills can be helpful in converting strength already gained in strength training into power. Experienced and well-trained players use exercises called plyometrics to enhance power. Plyometric exercises generally involve jumps and hopping with fast movement speed and minimal contact time between feet and the ground. Such exercises are very stressful, however, and are likely to cause injury if performed without sufficient initial fitness and without appropriate tuition. Individual plyometric exercises should only be performed for very short duration (never more than 10 seconds) and be followed by at least 1 minute's recovery.

Plyometric training should not be undertaken until the body has stopped growing. Plyometric training should be undertaken under the guidance of qualified instructors.

### Speed Training

General speed can be developed by either light-resistance work performed quickly such as medicine ball work or with very fast whole-body movements such as short sprints (e.g., 30m or across 4 courts, for example). Badminton speed must be developed as well and this is best achieved using the ideas already covered in this booklet (e.g., shadow, multifeed). It is essential that a player regularly performs specific speed training and that the duration of such sessions should be kept fairly short. Additionally, the duration of the periods of work in such a session must be kept to a minimum. The body will reach its maximum speed within 5 seconds of maximal exercise. If speed sessions include work periods of longer than 10 seconds then the session is not training speed. Equally, sufficient recovery must be given and for a speed session, recovery should be at least 5 times longer than the period of work.

A Badminton shadow play session made up of the following drill should be effective in promoting speed, provided that players move at maximal speed during the work.

Duration: 10 sec, with 40 – 60 sec recovery.

### Flexibility Training

There are a number of different situations where flexibility (stretching) work is performed. Stretching should be part of any warm-up and warm-down but stretching should also be performed by Badminton players with a view to promoting long-term increases in joint flexibility. High flexibility is essential in our sport and separate flexibility sessions should be performed regularly in addition to the stretching done as part of a warm-up / down.

If flexibility is performed as part of a warm up (and it should be), the aim is to make dynamic movements (i.e., not static stretches) throughout the range of motion for the main joints used in Badminton. This should involve focussing on the joints in the shoulder and lower body.

Flexibility should also be used in warm down as this helps to reduce subsequent injury risk. In this case, flexibility should involve static stretches where a muscle is stretched to close to its limit. At this point, there should be a very slight pain in the stretched muscle. This point should be held for 20-30 seconds before relaxing and repeating the same stretch 2-3 more times.

### **Summary**

The intention of this booklet has been to promote good practice and sound fitness-training principles for our sport. It is hoped that the booklet is thought provoking and that it may be effective in promoting reflection about training sessions that you may be performing on a regular basis. It is impossible for such a booklet to be comprehensive in its advice and you should be aware that some of the more demanding sessions here are only performed by the most highly trained players in the country. However, there should be many aspects of these principles which could be adopted very effectively for players at lower levels of play.

You are encouraged to contact the Strength & Conditioning Coach at the BAofE with any comments about the contents of this document.

Happy Training !