

BRITISH FENCING

British Fencing

Long Term Athlete Development

“Making your mark on the world is hard. If it were easy, everybody would do it. But it's not. It takes patience, it takes commitment, and it comes with plenty of failure along the way. The real test is not whether you avoid this failure, because you won't, it's whether you let it harden or shame you into inaction, or whether you learn from it; whether you choose to persevere.”

Barack Obama

“Our only sustainable competitive advantage is our ability to learn faster than the competition.”

Arie de Geus

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This plan is endorsed by the board of British Fencing

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Foreword

“The health and well being of the nation and medals won at major games is a simple by-product of an effective sport system”

Dr. Istvan Balyi

Long Term Athlete Development (LTAD) is core to everything we should do. It is a framework encompassing every element of fencing, which holds the fencer as an athlete as the focus of the sport. As a model it can act as a driver to all that we do as fencers, coaches and others who support the development of our sport.

The LTAD model is based on scientific principles of human growth and development and allows us to support our young fencers throughout a clearly defined pathway to achieve success on the world stage. It is a framework which allows the sport to work as one to effectively achieve 3 aims:

- Grow: To give more young people the opportunity to fence
- Sustain: To keep more fencers in the sport
- Excel: To achieve gold medal success on the world stage

A key benefit of LTAD is that it enables everyone associated with the sport to see their role and where they can fit into the overall plan. Coaches especially are key to this process and should integrate the principles of LTAD within their entire programme.

The LTAD model allows all fencers to clearly define what they want from the sport and to see the necessary work involved if their goal is long-term success. Fencers who train too little for to level success should recognise that fact and adjust their goals accordingly.

We have many fencers who train less than 10 hours a week and expect national success and international selection. Fencers training with these volumes can expect social, health, fun and other benefits; they can't expect to perform at the highest level or to complete in national teams.

It is clear that few clubs are in a position to offer all the training and support services fencers need to achieve at the highest level. This is where national programmes such as the regional and national academies will play a part. In addition, British Fencing's Swordmark programme will help clubs to develop and create links with other clubs.

The nature of sport training and selection means that not everyone can succeed at the highest level or continue training at high intensity. LTAD provides a framework for fencers to form goals and aim for lifelong participation.

“I genuinely believe that it has only been in the last couple of years that British Fencing – and fencers – has begun to understand what is needed to develop – and become – world class athletes in our sport”.

Graham Watts
British Fencing Performance Director

Neil Brown | Piers Martin

Introduction

"It takes 10 years of extensive practice to excel in anything."

H. Simon, Nobel Laureate

There is a well known maxim in sports training that it takes 10000 hours of practice to become expert in anything. This translates into an average of 3 hours a day for 10 years (this is progressive and increases over a fencer's career, nobody starts fencing with 3 hours a day of training)

In any endeavour, the best improvement is when practice is at the edge of ability and is dedicated to what has been called "Effortful Practice"¹. This means that training must be individualised and focussed to have the best value.

Practice doesn't make perfect, it makes permanent. Therefore quality is important at every stage of the fencer's development.

Generally fencers in the crucial stages of maturation from early to late teens improve in 2 ways:-

- Improved skill and ability through training
- Growing older

So it is important to make the training as effective as possible and this framework will show how all in the fencing family can help the fencing athletes improve in the most efficient way by utilising optimal window of trainability and providing the best possible environment for improvement.

Biological Age and Chronological Age

Competition is entirely based on chronological age – this means whilst athletes can be 4-5 years apart in biological age, they must compete together.

This is of fundamental importance to most sports, particularly fencing which has traditionally selected more physically developed (and therefore those who tend to score better on the ranking lists) rather than less physically developed fencers. The result is that the sport has focused on the immediate short term outcomes (generally seen as winning age group competitions) rather than developing those who have the potential to become the senior athletes of the future.

Research² has shown that fencing has a significant relative age effect and our systems select young fencers for training and competition opportunities based entirely on their results (which obviously favours early developers over late developers).

Recent evidence³ has shown that late developers have an advantage in the long term (as they spend more of their development life in a skill acquisition trainability window). See page 13 for optimal trainability information.

Because of this we must aim to design systems that will allow all fencers to reach their potential and understand the concepts of LTAD which helps with this.

¹ <http://www.scientificamerican.com/article.cfm?id=the-expert-mind>

² <http://www.teambath.com/wp-content/uploads/relative-age-effect.pdf>

³ <http://www.canadiansportforlife.ca/default.aspx?PageID=1055andLangID=en>

Why LTAD?

There are many reasons for introducing a Long Term Athlete Development system:

To establish a clear development pathway from starting fencing to long term success
To allow us to realign the competition programme to best serve the needs of the developing fencer.

To provide a planning tool for coaches and fencers

To help every fencer see where they are on the development pathway

To improve our success at major championships

It is important to understand that LTAD is not only about providing a foundation for performance but also for lifelong participation.

LTAD Fencing document

This framework document has three sections:

- **Where are we now?**
- **Where would we like to be?**
- **How are we going to get there?**

Where are we now?

This section of the plan provides the broad context that currently exists within fencing in Britain. It is not intended to cover all the strengths and weaknesses, merely to provide a short overview of the current position.

Where would we like to be?

This section of the plan presents the British Fencing goals and targets that have been produced by the Performance Director and the British Fencing board. In addition, it highlights guidance for club development and coach education, the two main vehicles for delivering LTAD principles.

How are we going to get there?

This section of the plan concentrates on the principles of LTAD as they relate to fencing in Britain. There is an explanation of the generic principles and presentation of the LTAD framework. This leads to further training, competition and programme guidance. The guidance is designed to assist coaches, clubs and administrators in delivering the LTAD principles towards achieving the British Fencing goals and targets.

We recognise that not many clubs will be able to deliver all elements of LTAD. However these are meant to be aspirational targets for existing and new clubs. The key is the athlete-centered approach that will provide an environment for fencers to achieve their goals.

The LTAD model is something that drives behaviour and encourages fencers and coaches to make steps towards improving standards.

LTAD Summary Table

	FUNDAMENTAL	LEARNING TO FENCE	TRAINING TO TRAIN	TRAINING TO COMPETE	TRAINING TO WIN
Stage of Maturation	Late Childhood				
		Early Puberty			
			Late Puberty		
				Early Adulthood	Adulthood
Chronological / Developmental Age	Chronological Age: -Male 6-9 years -Female 5-8 years	Chronological/ Developmental Age: -Male 9-12 years -Female 8-11 years	Developmental Age: -Male 12-16 years -Female 11-15 years	Developmental/Chronological Age: -Male 16-20 years -Female 15-18 years (<i>girls fully mature at 17</i>)	Chronological Age: -Male 20-25+ years (<i>boys fully mature at 23</i>) -Female 18-23+ years
Pathway stages	Build overall motor skills	-Learn Core Fencing Skills	-Building training capacity -Consolidate fencing skills	-Consolidate fencing skills -Utilise training capacity	-Maximising performance
Development Phases	Movement Literacy	-Skill Development	-Skill and Aerobic Development	-Competitive and Physical Development	-Specialisation and Performance -High level Competition Development
Progression	-FUN and participation. -General, overall development -ABCS: Agility, Balance, Coordination and Speed - Introduction to simple rules and ethics of sport	-Peak motor development. arms, legs, core, spine and ankle stability. -Participation in other sports -FUNdamental technical skills progressively more specific skills towards the end of the stage. -Medicine ball (1kg) , Swiss ball and own body exercises for strength. -FUNdamentals of ancillary capacities (<i>knowledge and experience</i>)	-Emphasis on aerobic conditioning -2 nd Speed window -Individualisation of fitness and technical training -Shoulder, elbow, core, spine, knee and ankle stability -Participation in other sports -Refinement of specific technical skills -FUNdamentals of tactical preparation -Introduction to mental preparation -Moral learning	-Fencing and individual specific physical conditioning -Shoulder, elbow, core, spine, knee and ankle stability -Basic tactical preparation -Individualisation of technical/tactical skills -Basic mental preparation -Development of fencing and individual specific knowledge and experience -Participation in complementary sports (<i>similar energy system and movement patterns</i>)	-Improvement of physical capacities -Shoulder, elbow, core, spine, knee and ankle stability -Modelling all possible aspects of training and performance -Frequent short breaks for injury prevention -Advanced tactical and psychological preparation -All aspects of training individualised and based on 5S (skill, speed, strength, stamina, suppleness) -Develop further ancillary capacities (knowledge and experience <i>there is no limit</i>) -Optimising of physical capacities
Growth and Development Considerations	-Emphasis on development of generic sports skills -1 st Speed Window (agility/quickness) Peak -Speed Velocity 1 (PSpV1); girls 6-8 yrs, boys 7-9 yrs	-Peak motor coordination (PMCV), emphasis on skill development before: girls 11 yrs, boys 12 yrs.	-Growth spurt, Peak Height Velocity (PHV), emphasis on aerobic development; girls 12-13 yrs, boys 13-15 yrs. -2 nd Speed Window (alactic) (PSpV2); girls 12-13 yrs, boys 13-15 yrs -1 st Strength Window (PSV); girls at end of PHV	-Peak Strength development (PSV), emphasis on strength development; girls 2 nd strength window at onset of menarche, boys 12-18 months after PHV	-Development then optimisation of stamina, strength, speed, skill and suppleness.

The LTAD Model for Fencing

	FUNDAMENTAL	LEARNING TO FENCE	TRAINING TO TRAIN	TRAINING TO COMPETE	TRAINING TO WIN
Other		-General lifestyle awareness (eating right, positive thinking)	-Specific Lifestyle awareness (nutrition, psychology, time planning, logging, etc.) -Balancing education and sport	-Basic video analysis increased emphasis on lifestyle awareness, cooking skills, personal responsibility	-Complex video analysis tactical analysis of individual opponents
Periodisation	-No Periodisation, but structured programme with progressive development	-Single Periodisation	-Single Periodisation	-Double Periodisation	-Generally double or triple dependent on year -Aiming to peak at Internationals as per long term programme -Frequent breaks -This is the training stage where periodisation is most important
Training Component Breakdown	<p>-General participation in sport 5-6 times per week. This should be multisport activity</p> <p>-All fencing training focuses on games, fun activity and fun competitions</p> <p>-FUNdamentals</p> <p>-Hand-eye coordination</p> <p>-Any team games</p> <p>-Basic skills and footwork games</p> <p>-Mini-fencing games</p> <p>-Elementary decision making skills</p> <p>Strength and Conditioning</p> <p>-General fitness and flexibility</p> <p>-Participation in other sports</p> <p>-Dance, gymnastics</p> <p>-Introduction to Swiss ball and basic medicine ball training</p>	<p>Movement skills</p> <p>-Learning and development of core footwork and balance skills</p> <p>Footwork</p> <p>-Learn skills, emphasis on correct technique</p> <p>-Coordination and balance</p> <p>Technical skills and lessons</p> <p>-Learning and development of blade skills and correct use of distance and timing</p> <p>-Use of attacks, defence and preparations</p> <p>-Learning of elementary tactical and decision making skills</p> <p>Sparring</p> <p>-Focus on putting skills into practice,</p> <p>Strength and Conditioning</p> <p>-General fitness and flexibility</p> <p>-Participation in other sports</p> <p>-Dance, gymnastics relevant</p> <p>-Swiss Ball and core strength</p> <p>-Basic body weight and resistance exercises (<i>callisthenics</i>)</p> <p>-Basic Medicine ball exercises</p> <p>-Emphasis on injury prevention training</p> <p>-Develop flexibility</p> <p>Training to Competition ratio (competition here includes competition –style training)</p>	<p>Footwork</p> <p>-Consolidate skills and continued technical drills</p> <p>-Increased volume</p> <p>Technical skills and lessons</p> <p>-Development of blade skills and correct use of distance and timing</p> <p>-Continued learning and development of tactical and decision making skill</p> <p>Sparring</p> <p>-Focus on putting skills into practice under some pressure.</p> <p>-Repetitive actions in different situations</p> <p>Strength and Conditioning</p> <p>-Increase aerobic training</p> <p>-Swiss ball and Core strength</p> <p>-Flexibility</p> <p>-Band work</p> <p>-Technique of resistance training</p> <p>-Elementary plyometrics (low volumes for injury prevention)</p> <p>-Participation in other sports</p> <p>-Cross training</p> <p>-When Growth spurt (PHV) occurs (girls 12-13 yrs, boys 13-15 yrs.), emphasis on aerobic development – swimming, running, rowing, cycling</p>	<p>Footwork</p> <p>-Consolidate skills and continued technical drills</p> <p>Technical skills and lessons</p> <p>-Development of blade skills and correct use of distance and timing</p> <p>-Increased development of tactical skill</p> <p>-Completion of learning of full range of technical actions</p> <p>Sparring</p> <p>-Consolidation of skills under pressure</p> <p>-Tactical skill development</p> <p>-Modelling of competitive scenarios</p> <p>Tactical</p> <p>-Full development of tactical abilities and putting into practice under pressure</p> <p>-Responsibility and leadership</p> <p>Strength and Conditioning</p> <p>-Swiss ball and core strength</p> <p>-Development of plyometrics</p> <p>-Flexibility</p> <p>-Band work</p> <p>-Compensatory training</p> <p>-Individual resistance training programme</p> <p>-Cross training</p> <p>development of plyometric exercise programme</p> <p>Training to Competition ratio</p>	<p>Footwork</p> <p>-Emphasis on functional use, tactical and competitive drills</p> <p>Technical skills and lessons</p> <p>-Full development of blade skills and correct use of distance and timing</p> <p>-Emphasis on perfecting appropriate style</p> <p>Sparring</p> <p>-Competitive activity, focussing on successful actions and maintaining technique under pressure</p> <p>-Complex tactical training and scenarios</p> <p>Tactical</p> <p>-Full development of tactical abilities and putting into practice under pressure</p> <p>-Focus on dealing with individual opponents</p> <p>-Responsibility and leadership</p> <p>Strength and Conditioning</p> <p>-Maximal strength training to aid power development and speed</p> <p>-Swiss ball and core strength</p> <p>-Plyometric programme included as core component</p>

The LTAD Model for Fencing

	FUNDAMENTAL	LEARNING TO FENCE	TRAINING TO TRAIN	TRAINING TO COMPETE	TRAINING TO WIN
		70:30	-Introduction to free weights (18 months after PHV) Training to Competition (competition here includes competition –style training) ratio 60:40	(competition here includes competition –style training) 40:60	(monitor for overuse injuries) -Speed agility -Compensatory training -Flexibility -Cross training Training to Competition (competition here includes competition –style training) ratio 25:75
Progressive Training to Competition (and competition–style training) ratios	-S&C:70% -Fencing skill:20% -Fencing tactical: 10%	-S&C, fitness:60% (including other sports) -Fencing skill:25% -Fencing tactical: 15%	-S&C, fitness:40% (including other sports) -Fencing skill:35% -Fencing tactical: 25%	-S&C, fitness:30% -Fencing skill:30% -Fencing tactical: 40%	-S&C, fitness:35% -Fencing skill:20% -Fencing tactical: 45%
Total Training Hours (These are generic to sport and heavily researched figures, include all aspects of training)	-Sessional	5-10	14-20	20-24	24-30
Competition* Level	-No <i>formal</i> competition -FUN games	-Local and County	-County and Regional Introduction to International with 1 event per year	-Regional and National (International events as development)	-International
Competition Number (per year)	-Festivals, e.g. multisport events, friendly club events	6	10	12-15	10-12
International Competitions		-1 age group at own age	-1 age group international at own age -European cadet circuit events	-European Cadet circuit events -Junior world cup -European cadet and junior championships -World Cadet and Junior championships	-Commonwealth Games -Universiade -European Championships -World Championships -Olympic Games
Competition* Outcomes	-Participation -Varied formats -Few rules	-Concentration on development -Can have adapted rules and equipment -Rule of 3 (3 levels of events for individuals: easy, competitive, and hard)	-Concentration is still on development -Tactical skills tested in competition context -Introduction to international competition -Get used to winning -Rule of 3	-Development of competition outcome awareness -Application of techniques within competition context -Individual targets relevant to long term goals -Introduction to higher level international competition -Rule of 3 still applies	-Individual and team targets relevant to long term goals -Gaining experience through exposure to high level competition pressure situations -Individual and team targets relevant to long term goals -Olympic Gold

* A competition is defined as an event that requires alteration or modification to an athlete's training programme

Late Entry programmes underpin this framework and are established appropriate to individual need

Where are we now?

General Sport Observations

The following points are general observations made about various sporting systems in this country and of those around the world:

- Young athletes under-train, over-compete.
- High competition to training ratios in early training years.
- Adult competition schedule superimposed on young athletes.
- Adult training programmes superimposed on young athletes.
- Male programmes superimposed on females.
- Training in early years focuses on outcomes (winning) rather than processes (optimal training).
- Competition encourages short term success which can lead to long term failure (building the senior athlete)
- Chronological age dominates training rather than maturation level/developmental age.
- The *critical* periods of accelerated adaptation are not recognised and utilised.
- Training is not optimised at the early training ages (6-16 years). This cannot be fully overcome, resulting in athletes never reaching their full genetic potential.
- The best coaches are encouraged to work at elite level.
- Coach/Teacher education does not sufficiently cover the growth, development and maturation of young people.
- Administrators, officials, coaches, parents and fencers need to be educated in LTAD principles
- Parent's education is neglected with regards to long-term athlete development (nutrition, regeneration, maturation and psycho-social development, etc.)
- Administrators education is neglected with regards to some of the essentials of organisation and club development
- Lack of optimal integration of sport science, sport medicine and sport-specific technical-tactical activities

Specific Fencing Observations

The following points are more specific observations made of fencing in this country:

- Fencers expect the rewards of international selection with too little preparation and training
- With some notable exceptions, poor results at major international events
- Competition based programmes and selection rather than training based
- Too little emphasis is placed on the full range of skill development
- Club orientated rather than fencer focused environment
- Too few networks of clubs
- History of excuses
- Professional coaches are protective of their own circuit of schools and clubs
- Traditional coach education programmes where too much emphasis is based on technical coaching
- Too many clubs trying to do too much rather than concentrating on their strengths
- There is often a single weapon focus rather than initial generic fencing training for very young fencers
- High cost and limited access to training facilities
- Clubs trying to undertake competitive development and performance with insufficient training time
- Clubs trying to move too quickly through the pathway – eg. too many tactics being coached to very young fencers

Many of these issues have been highlighted for years as fundamental flaws in our system

Many coaches, fencers and parents are too focussed on short-term goals. Young fencers often spend vast amounts of time, effort and money travelling long distances to competitions.

“We are in a position where our young fencers are reasonably competitive internationally from the ages of 10 – 15. However, beyond this point, the gulf between ‘us and them’ becomes wider and wider. This is because our infrastructure does not encourage our fencers to improve sufficiently on a long-term basis and consequently by the time they reach senior level, many fencers are not strong enough, fit enough and do not have the skills needed to compete at the highest level, let alone win.”

Neil Brown, 2008

Where would we like to be?

British Fencing

"WE ARE A WORLD LEADING FENCING FAMILY"

OPPORTUNITIES FOR ALL TO START STAY AND SUCCEED IN FENCING
we will be Open, Fair, Welcoming, Loyal and Innovative
Everyone displays team spirit: *"I am a positive ambassador for the Fencing Family"*

FENCING:2020 - BUILDING A STRONG, SATISFIED and SUCCESSFUL SPORT

British Fencing Goals

- To be a world leading sport governing body
- To have a world class club, competition and coaching structure
- To grow the sport and to give many more people the opportunity to start fencing and learn about the sport
- To allow all people involved in the fencing family to achieve their goals within the sport.
- To be challenging for medals in every senior major championship

In order to achieve these we need the following things

- A clear understanding of the practical elements of the LTAD model by coaches and others who run the sport
- A coherent plan for competitions and calendar planning
- Ongoing and continuous club development
- Ongoing coach development and education with continuous professional development (CPD) being the norm for all coaches.
- The establishment and development of the National Academy and links with educational establishments.

The following objectives are to be achieved by 2013:

Club Development

A Club Development Programme (Swordmark) will be fully established. This will be an accreditation scheme for clubs and will ensure they operate in a safe and effective way. Clubs will be expected to work in networks for the benefit of the fencer as athlete.

Very few, if any, clubs will be able to offer the full range of training environments for long-term training from under 10 to elite fencers. All clubs will be able to see their place on the roadmap.

The LTAD Model for Fencing

By 2013, there will be:

140 Swordmark accredited clubs
9 Regional academies
500+ affiliated clubs

Competition Development

Competitions will link to development outcomes in line with LTAD principles. Appropriate limits to the frequency and level of competitions will have been established.

Coach Education and development

A new coach education programme will have been fully implemented and will align with the sports coach UK framework. This will be supported by a network of opportunities for coaches to continually develop through the Regional and National Academy programme. All coaches will be licensed to ensure quality.

Facilities

In order to achieve these targets, access to facilities, which are both affordable and appropriate to a fencer's level of development, is key. British Fencing will work to establish the following:

A greater understanding of the adaptability of mini-fencing in clubs and schools. Linked to the national competition framework for schools.
At least 9 regional academies offering training and development sessions for talented fencers.

Partnerships

Through Swordmark, begin to establish networks of clubs with nationally recognised quality standards.

Through local partners and schemes such as the Government's PE, School Sport and young people (PESSYP) programme, to assist the move from mini-fencing or fencing classes at primary schools into structured club pathways.

At local level and regional level to assist Clubs to develop through partnerships with local sport and leisure commissioners, providers, County Sport Partnerships etc.

At National level to raise the awareness of Fencing through lobbying key strategic partners eg. Department of Culture Media and Sport (DCMS), Department for Education and Science (DfES) Department of Health and Sport England.

How are we going to get there?

“Getting ahead in a difficult profession requires avid faith in yourself. That is why some people with mediocre talent, but with great inner drive, go much further than people with vastly superior talent.”

Sophia Loren

“Sooner or later, those who win are those who think they can.”

Richard Bach

Long Term Athlete Development is a sport development framework that is based on human growth and development, and proper training, competition and recovery programming; before, during and after maturation. In short, it is about adopting an athlete centred approach to fencing training. So we have to know about the important growth and development considerations.

Sensitive Periods of trainability

*“Long Term Athlete Development is about achieving **optimal** training, competition and recovery **throughout** an athlete’s career, particularly in relation to the important maturation years of young people.”*

Balyi (2002)

Trainability is the capability to improve in response to stimuli. Research shows that there are certain windows of opportunity in which various types of training are most efficient. If these windows are missed, fencers can never reach their full genetic potential. If coaches are aware of these opportunities they can prepare fencers in the best way for long-term success.

So this means that young fencers should be exposed to different types of training depending on their physical maturation.

The fastest period of growth occurs for girls at 11-14 and for boys at 12-16. The development of the internal organs (essential for aerobic and anaerobic energy systems) match the height growth pattern. Strength increases match the growth pattern for body weight.

How old is a 13 year old?

There can be significant differences in chronological and biological age at this age, fencers the same age can be up to 4 years apart in biological age at this point and coaches should be aware of the consequences of this.

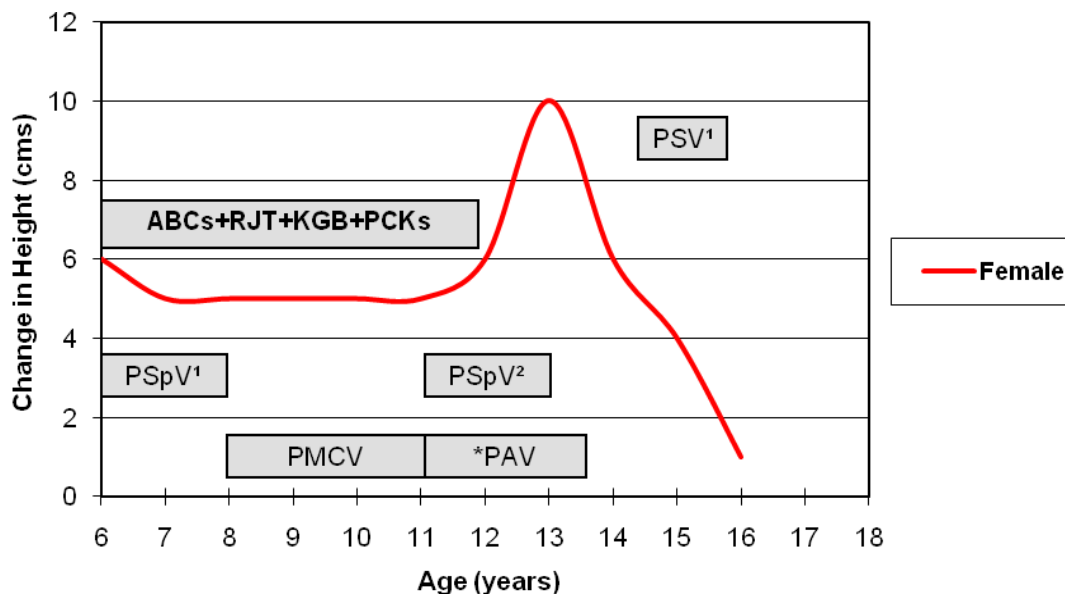
Peak Height Velocity (PHV)

PHV is the time of life where growth is at its greatest rate. It can be determined by regular measurement of height. Obviously it's important to do this accurately and in a consistent manner. It should be done at the same time of day (everyone is taller in the morning due to the compression of intra-vertebral discs over the course of the day. Measurement of seated height is more effective in determining PHV than standing height. Knowing this can identify optimal periods of trainability.

Sensitive Periods of Trainability - Female⁴

Reference points: Onset of Peak Height Velocity (OPHV) and Peak Height Velocity (PHV – the actual peak, before reduction of growth rate)

Example charts are below. In these the rate of change in height (Height Velocity) is measured in cm/year.



Peak Aerobic Velocity (PAV) is at Onset of Peak Height Velocity (OPHV) (approximately 11-13 in this diagram)

The 1st Strength Window (PSV¹) is immediately after PHV

The 2nd Strength Window (PSV²) is with the onset of menarche

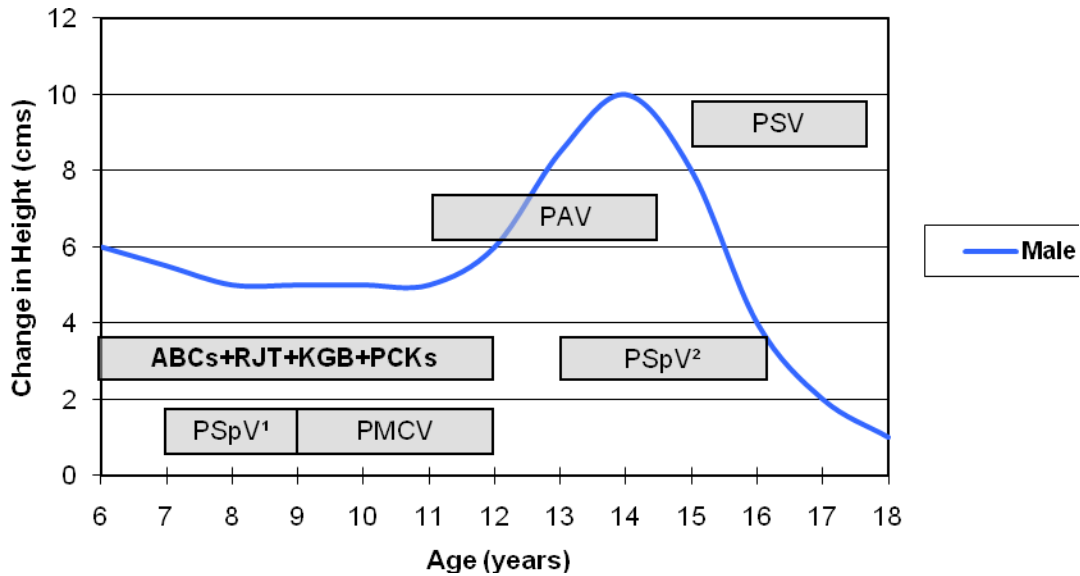
Age	Elements to be trained	How age is measured
5 – 11 years	Skill development (ABCs, RJT, KGB and PCKs)	Chronological age
6 – 8 years	Speed development (PSpV1)	Chronological age
8 – 11 years	Motor Co-ordination development (PMCV)	Chronological age
At OPHV	Aerobic development (PAV)	OPHV
11 – 13 years	Speed development (PSpV2)	Chronological age
No age	Strength development (PSV): Phase 1: Immediately after PHV Phase 2: With onset of Menarche	Phase 1: Immediately after PHV Phase 2: With onset of Menarche

⁴ Balyi and Hamilton (1999)

Sensitive Periods of Trainability - Male

Reference points: Onset of Peak Height Velocity (OPHV) and Peak Height Velocity (PHV – the actual peak, before reduction of growth rate)

Example chart:



Peak Aerobic Velocity (PAV) occurs at Onset of Peak Height Velocity (OPHV) (approximately 11-12 in this diagram)
Peak Strength Velocity (PSV) occurs 12 - 18 month after PHV (approximately 15-16 in this diagram).
There is no second Strength Window for males.

Ranges for Sensitive Periods of Trainability for males in relation to PHV, where PHV = 14 years:

Age	Elements to be trained	How age is measured
6 – 12 years	Skill development (ABCs, RJT, KGB and PCKs)	Chronological age
7 - 9 years	Speed development 1 (PSpV1)	Chronological age
9 – 12 years	Motor Co-ordination development (PMCV)	Chronological age
At OPHV	Aerobic development (PAV)	Onset of PHV
12 – 18 months after PHV	Speed development (PSpV2)	Chronological age
16 – 18 years	Strength development (PSV)	12-18 months after PHV
16 – 17 years	Peak Weight Velocity (PWV)	12-18 months after PHV

The LTAD Framework for Fencing

Study of mean ages of international fencers⁵ has shown that male fencers generally peak at 27 years whilst female fencers peak at 26. The optimal age to therefore specialise is during the Training to Train Phase (males: 12- 16, females: 11-15). However, many fencers remain at international level at significantly older ages than these peaks, particularly men's epee.

Burnout and early/late specialisation:

Specialisation in one sport before the age of 10 is not recommended for late specialisation sports as this has been shown to contribute to one dimensional preparation, injuries, physical and mental burnout, and early retirement⁶

A vital period for the development of motor coordination for children is between the ages of nine and twelve⁷. During these years children are developmentally ready to acquire the fundamental movement and fundamental sport skills which are the cornerstones of all athletic ability. These fundamental skills include running, throwing, jumping and landing etc, the ABC's of athleticism. Teaching these skills will lay the foundations for athletic excellence in later years. If the fundamental motor skills are not acquired between the ages of nine and twelve these skills cannot be fully recaptured at a later time (although remedial work can contribute to limited improvement).

The Stages of the Fencing LTAD Framework

Average age for fencers competing at Olympic games from 68 -92 was 24.1 years⁸. As a consequence, the specialisation of fencers does not need to begin until early to mid teens and, as with many sports, fencing can therefore be classified as a late specialisation sport. Because of this it requires a more generic, holistic approach to early training and development. Fencing sessions should emphasise the development of general, fundamental motor and technical skills and work to build an athlete first and a fencer second rather than making a fencer and turning them into an athlete.

FUNDamentals
Learning to Fence
Training to Train
Training to Compete
Training to Win

⁵ Data from Olympic fencers in Beijing

⁶ Harsanyi, 1985

⁷ Balyi and Hamilton, 1995; Rushall, 1998; Viru et al., 1998

⁸ Bompa.

The LTAD Model for Fencing

	FUNDAMENTAL	LEARNING TO FENCE	TRAINING TO TRAIN	TRAINING TO COMPETE	TRAINING TO WIN
Stage of Maturation	Late Childhood				
		Early Puberty			
			Late Puberty		
				Early Adulthood - Adulthood	
Chronological / Developmental Age	Chronological Age: - Male 6-9 years - Female 5-8 years	Chronological/ Developmental Age: - Male 9-12 years - Female 8-11 years	Developmental Age: - Male 12-16 years - Female 11-15 years	Developmental/ Chronological Age: - Male 16 - 20 years - Female 15-18 years <i>(girls fully mature at 17)</i>	Chronological Age: - Male 20 – 25+ years <i>(boys fully mature at 23)</i> - Female 18 – 23+ years

*Shaded area indicates levels which involve *developmental* ages

Each level identifies criteria of principles and guidelines, which should be met before progressing to the next stage. This is not to say that fencers cannot begin to fence at older ages, however, progressing through each of the levels in turn will enable fencers to achieve their full genetic potential.

LTAD Stages

Stage 1 – FUNdamentals (basic physical literacy)

Chronological Age: -Male 6-9 years -Female 5-8 years
Build overall motor skills
Movement Literacy -FUN and participation. -General, overall development -ABCS: Agility, Balance, Coordination and Speed - Introduction to simple rules and ethics of sport

The FUNdamentals stage should be fun! The emphasis is on developing basic physical literacy and fundamental movement skills.

Skills are:-

ABCs (**A**gility, **B**alance, **C**oordination, **S**peed),

RJT (**R**unning, **J**umping, **T**hrowing),

KGBs (**K**inesthetics, **G**liding, **B**uoyancy, **S**triking with the body) and

CPKs (**C**atching, **P**assing, **K**icking, **S**triking with an implement).

Participation in as many sports as possible should be encouraged.

Stage 2 – Learning to Fence (learning fencing technique)

Chronological/ Developmental Age: -Male 9-12 years -Female 8-11 years
-Learn Core Fencing Skills
-Skill Development
-Peak motor development. arms, legs, core, spine and ankle stability. -Participation in other sports -FUNdamental technical skills progressively more specific skills towards the end of the stage. -Medicine ball (1kg) , Swiss ball and own body exercises for strength. -FUNdamentals of ancillary capacities (<i>knowledge and experience</i>)

During this stage young fencers should learn how to train and develop the skills of fencing. Additionally, participation in other sports should be encouraged. They should also learn basic sports skills and other essential elements, including:

- Warm up and cool down
- Stretching
- Hydration and nutrition
- Recovery
- Relaxation and focusing

This stage is very important in terms of skill development. Fencers sometimes plateau during their later stages of development and one reason is that they missed the opportunity to fully develop technique at the optimal time in their development.

Stage 3 – Training to train

Developmental Age: -Male 12-16 years -Female 11-15 years
-Building training capacity -Consolidate fencing skills
-Skill and Aerobic Development
-Emphasis on aerobic conditioning -2 nd Speed window -Individualisation of fitness and technical training -Shoulder, elbow, core, spine, knee and ankle stability -Participation in other sports -Refinement of specific technical skills -FUNdamentals of tactical preparation -Introduction to mental preparation -Moral learning

At this stage it is very important to keep the focus of the fencer on training and not too much on competition and competition outcomes. There should be an increased emphasis on setting goals for each competition.

With the onset of PHV fencers are in an optimal time for developing endurance fitness, so the total volume of training should increase at this stage. Because of this the number of competitions may be reduced and fencers have to be careful of injuring rapidly growing long bones.

In this phase skill acquisition is best done in short sessions of intense activity.

The LTAD Model for Fencing

Stage 4 – Training to Compete

Developmental/Chronological Age: -Male 16-20 years -Female 15-18 years (<i>girls fully mature at 17</i>)
-Consolidate fencing skills -Utilise training capacity
-Competitive and Physical Development
-Fencing and individual specific physical conditioning -Shoulder, elbow, core, spine, knee and ankle stability -Basic tactical preparation -Individualisation of technical/tactical skills -Basic mental preparation -Development of fencing and individual specific knowledge and experience -Participation in complementary sports (<i>similar energy system and movement patterns</i>)

During this stage there should be an increase in the intensity of training, the aim is to keep the total volume up while gradually increasing the intensity. Fencers should be carefully monitored for injury at this time.

The overall training plan should be based around double periodisation which fits with the selection year for fencers of this age.

Competitions should be carefully targeted while fencers tactical skills are being developed.

Fencers knowledge of other sport skills (eg warm up, nutrition, hydration, etc) should be refined and individualised at this stage.

Fencers can begin to do strength training, approx. 18 months after PHV

Stage 5 – Training to Win

Chronological Age: -Male 20-25+ years (<i>boys fully mature at 23</i>) -Female 18-23+ years
-Maximising performance
-Specialisation and Performance -High level Competition Development
-Improvement of physical capacities -Shoulder, elbow, core, spine, knee and ankle stability -Modelling all possible aspects of training and performance -Frequent short breaks for injury prevention -Advanced tactical and psychological preparation -All aspects of training individualised and based on 5S (skill, speed, strength, stamina, suppleness) -Develop further ancillary capacities (knowledge and experience <i>there is no limit</i>) -Optimising of physical capacities

This is the final stage of preparation. Fencers should arrive here having learnt and perfected technical and tactical elements of their game. They are physically and mentally ready to perform at the highest level.

Training should be individualised and tailored to individual fencers. The emphasis is on performance enhancement, peaking for specific competitions and major events. Fencers should now have experience of competing in high pressure situations

Training and Competition

“It is impossible to train effectively if an athlete is seeking to win competitions on umpteen weekends throughout the year; there is also a need to balance training between the different skill sets required for team and individual fencing; traditionally British Fencing has always put too much emphasis on competitive success at youth level (probably because of undue parental influence) and too much emphasis on world cups events as opposed to THE World Championships. Correcting these various balances is what we are seeking to achieve.”

Graham Watts
British Fencing Performance Director

It is an accepted fact that within fencing, as with many sports, many fencers compete too often and train and prepare too little. A balance needs to be struck between the amount of time spent training and the amount of time spent competing. At this point it is important to identify the difference between competition specific training (ie. training fights, sparring, training competitions) and formal competition.

Formal competition can be defined as an event which needs modification to a fencer's planned training programme.

Talent Development

The Fencing Calendar highlights the current abundance of competitions available to fencers within all age groups. Historically many coaches have taken the view that young fencers need to be exposed to as many competitions as possible and at the earliest age possible to enable them to gain valuable experience.

Additionally pressure is placed on both the fencers and the coaches to achieve short term success with fencers trained and selected to win competitions rather than assist with the overall long term development of the individual (focusing on the outcomes rather than the process). This leads to two key problems. Firstly, fencers are selected for their size rather than their ability (ie. there is an emphasis on selecting larger fencers, or early maturers, who can beat smaller fencers, or late maturers). Secondly, coaches focus on preparation for upcoming competitions and less on technical training. The omission of skill acquisition for this development stage can never be fully recovered.

LTAD principles would oppose this view.

Training

Training for Fencing consists of three key elements:

Fencing Skill and specific Fitness: footwork and lessons

Strength and Conditioning training: can include footwork and lessons

Fencing Technical and Tactical/Decision Making: can be in lessons, structured sparring or free play

Traditionally, fencing training has focused on the third element, however research has shown that each individual component of the training is as important as the others. Dependent on the stage of development, the proportion of these elements

The LTAD Model for Fencing

can change dramatically as the emphasis remains on building abilities that allow long-term success.

The importance of technical skill and fitness cannot be over emphasised, particularly during early stages of development (where the acquisition of fencing and movement skills are important) and during the Training to Train stage (where the development of an aerobic base is important). It is therefore imperative that fencers are able to access a structured teaching and coaching environment throughout their development.

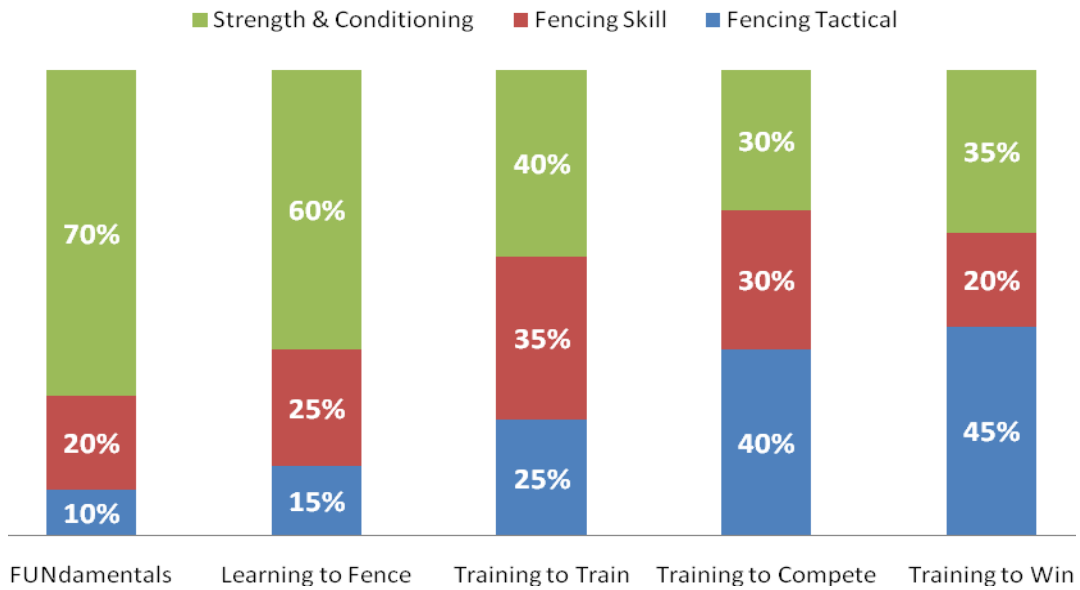
For most top-level fencers the time spent in individual lessons is key to successful development. Therefore, fencers need to make the most of all individual contact time with their coach.

Approximate Training Proportions

British Fencing recommends the following ratios be used as *guidance* when formulating individual and group training programmes:

Level	Strength and conditioning To include some motor skill development, e.g. balance, coordination	Fencing skill (A lot of skill development can be linked to SandC training)	Fencing tactical
FUNdamentals	70%	20%	10%
Learning to Fence	60% (inc. other sports)	25%	15%
Training to Train	40%	35%	25%
Training to Compete	30%	30%	40%
Training to Win	35%	20%	45%

Training Proportions By Developmental Stage



Volume, Intensity and Frequency

An important point for consideration regarding training is the relationship between intensity and volume (of time).

Volume can be described as the quantitative component of training containing the duration of the exercise. Included in the total training hours are supporting activities such as planning, video analysis, etc. When designing training plans the time taken to travel to training sessions or competitions should be taken into account

Intensity can be described as the qualitative element of training containing all training activities performed within a given unit of time.

Frequency refers to a number of training sessions within a given time frame (eg. a day, week or microcycle).

During the early phases of development (FUNdamentals – Training to Train) and particularly when fencers are building their aerobic base, fencing training should be high volume (10-20 hours per week) but low intensity. A problem in achieving this is available time and keeping the number of sharp foot contacts to an acceptable level from an injury-prevention point of view. As a guide, a fencer within the Training to Train phase should be at the correct volume of approximately 14-20 hours per week.

Conversely, when acquiring or training fencing specific skills, high intensity short bursts of approximately 15-20 seconds, or low volume (time) of quality work at high intensity, can be used. Longer periods cause a drop in quality and contribute to a fencer getting better at moving slowly. Similarly, short interval training should be used to develop speed and reaction based movement using short work and rest times, again maintaining quality. It is important to note that speed training and skill acquisition should occur at the beginning of a session when fencers are fresh, rather than later when fatigue has set in.

The LTAD Model for Fencing

Its important to plan recovery time into every training plan, this is most important at later stages of development when fencers are training for their absolute peak performance.

Finally, dependent on the phase of development and individual programme, coaches should ensure that a reasonable period of any session is undertaken with fencers working at 20-30 bpmHR (beats below maximum heart rate) to contribute to the overall volume of aerobic activity.

Competition is a good servant but a poor master

“British Fencing has for too long operated with a regime of competition after competition, fencers expect success without the commitment to training and preparation to achieve this success.”

Competition should be regarded as an integral part of the fencer’s overall training and development programme and is a means to an end (the long term development of the athlete) rather than an end in itself.

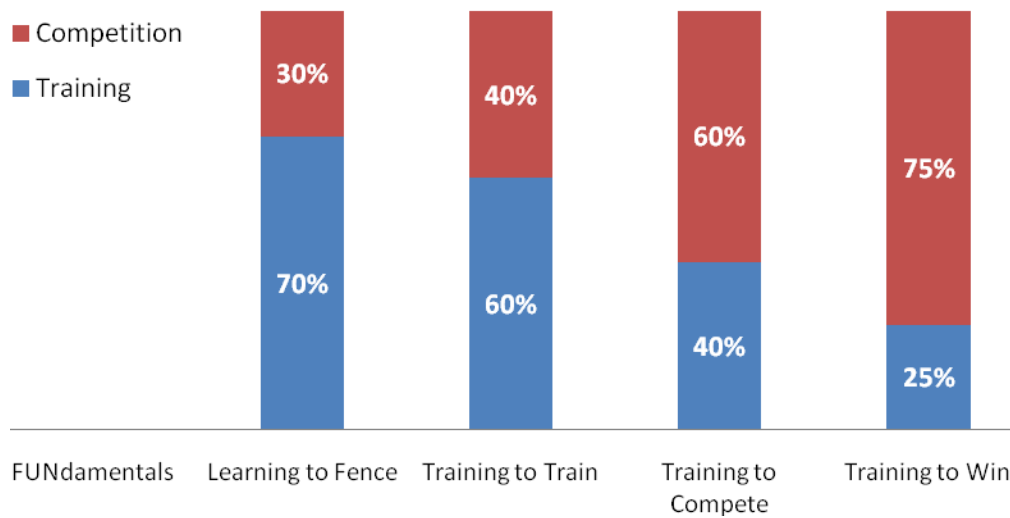
As has been mentioned already in this document, fencing in Britain has traditionally maintained a competition based rather than training based programme. This has led to a severe underinvestment of time in developing a solid skill, fitness and strength base to enable fencers to compete effectively at senior level.

Training to Competition Ratios

British Fencing recommends the following ratios be used as *guidance* when formulating individual and group training and competition programmes:

Level	Ratios for Training vs. Competition and Competition-style Training	Number of Competitions per year
FUNdamentals	FUN play + Festivals (new format competition)	
Learning to Fence	70:30	6
Training to Train	60:40	10
Training to Compete	40:60	12-15
Training to Win	25:75	10-12

Ratio of Competition to Training By Developmental Stage



Competencies

Ideally, fencers should not miss out any stages of the *Pathway* (as seen in the following diagram), but should progress through it. Chronological and developmental age groups will govern this advancement, however a checklist of skills or identified *competencies* are also required to allow fencers, and those who support them, to see tangible evidence of their development. This also assists coaches with identifying strengths and weaknesses, which in turn allows a more individual approach to programming.

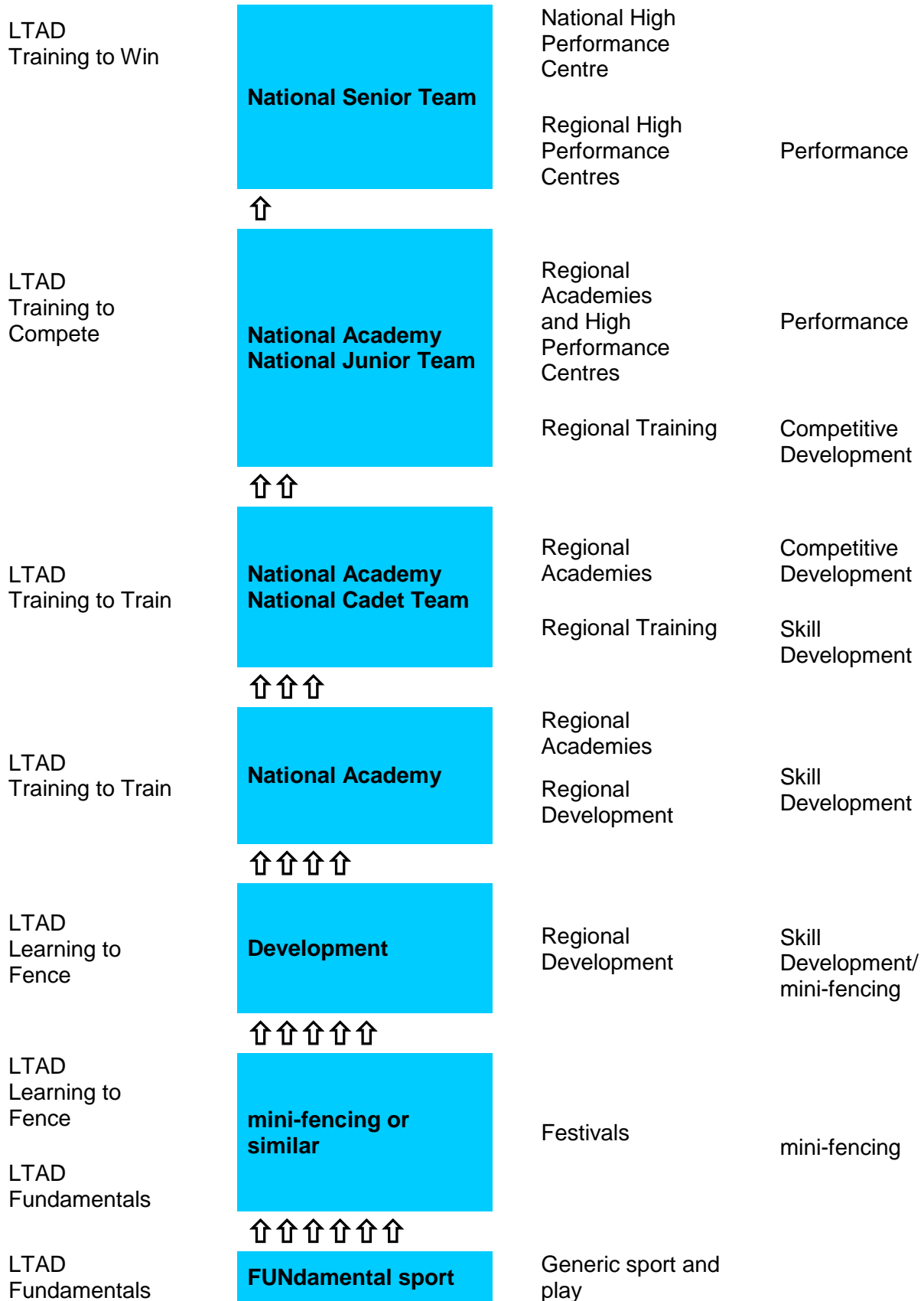
Appendix I summarises the framework and details which skills should be developed at each phase of the fencer pathway. From this a series of competencies can be established, along with testing procedures which will allow achievement to be measured.

These competencies are likely to change frequently as the sport aligns itself with the principles set out within this framework.

National Competition Framework

In order to establish a competition structure which puts the fencer first, a *National Competition Framework* is being adjusted to fit into the principles of LTAD. This will expand on the guidance already given within this document and will form the basis for all competition formats organised by clubs or other organisations. Whilst some re-structuring will be needed, it may be better to not undertake some of these changes suddenly but to encompass them within the development plans (described in more detail in the next section), thus introducing them incrementally. However, it must be made clear that the overall competition framework *must* put the long term development of our fencers first.

The Fencing Development Pathway



The Implementation of LTAD

One of the greatest benefits of LTAD is that the model provides the sport with an opportunity for self-examination. This allows fencing to clearly identify where there may be gaps or problems in the way the sport is currently organised.

LTAD will be put into practice through:

Club Development
National Programmes (Development and Performance)
Coach Education

Swordmark

Swordmark is part of British Fencing's club development and accreditation programme. It is a planning tool, which encourages clubs to put the needs of the fencer at the centre of their activities. It helps clubs to provide the best possible environment to deliver the principles of LTAD. This should encourage clubs to:

Examine their existing activities to identify current strengths and weaknesses;
Identify their future direction and aspirations
Produce an action plan that will help meet their future direction and aspirations and bridge any gap that might exist between the current position and the Swordmark accreditation criteria

Achieve Swordmark accreditation at one or more of four levels:

- mini-fencing FUNdamentals
- Skill Development Training to Train
- Competitive Development Training to Compete
- Performance Training to Win

This framework will also, if understood correctly, assist fencing clubs in forging strong links with other clubs outside of the sport. Central to this is the cross-disciplinary relationship with other sports clubs.

Additionally, as sports such as gymnastics are early specialisation sport and fencing has been identified as a late specialisation sport, it is envisaged that sports like this will provide an entry into fencing.

School-Club links

There is an increasing focus on the links between schools and sports clubs. mini-fencing and other programmes have been hugely successful in providing opportunities for young people to get involved with fencing at primary school level, however it is important that an outlet is created for this interest. Given that fencing is a late specialisation sport, the role of schools at primary level can be to create interest in the sport and use and in delivering the FUNdamentals of all sport. It is then the role of the club to work with its partners to access this potential and develop it.

The National Academy

The National Academy programme, supported by regional academies, will be a large part of the delivery mechanism for future developments. By 2013 upwards of 1000 fencers will be part of this programme. The delivery may be different in different parts of the country but will be based around monthly training and education sessions and bi-annual national academy activities.

The activities of this will be driven by LTAD principles.

Coach Education

The current coach education certification and development programme is undergoing review in line with sports coach UK School Games framework. In addition, it is intended that the LTAD principles will permeate throughout British Fencing and the home countries revised coach education and development programme.

Coaching and development plans

LTAD presents an ideal framework. It explains how fencers should best progress through a pathway detailing exactly what they should be doing and when.

The benefits of LTAD are considerable for everyone within fencing. However, it is extremely important that the parts of the overall framework (from FUNdamentals right through to Training to Win) are not picked out individually. Rather, they are seen as part of one sports system. The challenge to the sport and its partners is to find ways of linking all our activities to achieve a coherent approach to developing fencers to their full potential.

Glossary

Abbreviation	Term
ABCs	Agility, Balance, Co-ordination, Speed.
RJT	Running, Jumping, Throwing.
KGBs	Kinesthetics, Gliding, Buoyancy, Striking with the body.
PCKs	Passing, Catching, Kicking and Striking with an implement.
PHV	Peak Height Velocity (the maximum rate of change in height), commonly known as “growth spurt”.
OPHV	<i>Onset</i> of Peak Height Velocity (the maximum rate of change in height).
PSpV	Peak Speed Velocity (the maximum rate of change in speed).
PMCV	Peak Motor Coordination Velocity (the maximum rate of change in motor coordination).
PAV	Peak Aerobic Velocity (the maximum rate of change in aerobic capacity).
PSV	Peak Strength Velocity (the maximum rate of change in strength).
PWV	Peak Weight Velocity (the maximum rate of change in weight).
USIT	Ultra Short Interval Training (alactic)
Mini-fencing	Fencing using foam or plastic equipment
S&C	Strength and Conditioning

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Appendix I – Age data from Beijing Olympics

Event	Average Age
Men's Epee	29
Men's Foil	26
Men's Sabre	27
Women's Epee	27
Women's Foil	28
Women's Sabre	25

Appendix II – Growth and Development

Armstrong and Welsman (1997) reported that *all young people follow the same pattern of growth and infancy through adolescence, but there are significant individual differences in both timing and magnitude of change in stature*

There are seven key phases in human growth and development of which this framework focuses on three:

- Late childhood
- Adolescence
 - Early Puberty
 - Late Puberty
- Early Adulthood

These changes in growth and development can be tracked using characteristics of physical, mental/cognitive and emotional development (adapted from Balyi [2002] A Step by Step Planner of Annual Training, Competition and Recovery Programmes).

The basic characteristics inherent within each stage of development, the associated consequences, performance capabilities and limitations and implications for coaches are summarised in the following tables:

Late Childhood

Physical Development Characteristics and their implications

Basic Characteristics	General consequences: performance capabilities and limitations	Implications to the Coach
Larger muscle groups are more developed than smaller ones.	The child is more skilful in gross movements involving large muscle groups rather than precise coordinated movements involving the interaction of many smaller muscles.	General basic skill should be developed during this phase.
The size of the heart is increasing in relation to the rest of the body. The cardiovascular system is still developing.	Endurance capacity of the young participant however is more than adequate for most activities (little aerobic machines).	Short duration anaerobic activities to be planned (alactic). Endurance must be developed through play and games (lack of attention span for continuous work).
Ligamentous structures are becoming stronger, but the ends of the bones are still cartilaginous and continue to calcify.	The body is very susceptible to injuries through excessive stress or heavy pressure.	Slow progression in hopping bounding, own body weight, medicine ball exercises (neural recruitment).
Basic motor patterns become more refined towards the end of phase and the balance mechanism in the inner ear is gradually maturing.	There is great improvement in speed, agility, balance, coordination and flexibility toward the end of this phase.	Specific activities and games should emphasize coordination and kinaesthetic sense e.g. gymnastics, swimming, athletics.
During this phase, girls develop coordination skills faster than boys but there are generally no differences between boys and girls.	Sex differences are not of any great consequence at this stage in development.	Training and playing together should be emphasized at this age and phase.

Mental/Cognitive Development Characteristics and their implications

Basic Characteristics	General consequences: performance capabilities and limitations	Implications to the Coach
Attention span is short and children are very much action oriented. Memory is developing in a progressive way.	Young fencers cannot sit and listen for long periods of time.	Use short, clear and simple instructions. Children want to move and participate in action.
Children in this phase have very limited reasoning ability. Later in the phase there is a growing capacity for more abstract thought.	Children are generally leader oriented - love to be lead!	Coaches should adopt a “follow me” or “follow the leader” approach and ensure that all activities are fun and well planned.
The repetition of activities is greatly enjoyed. Children improve their abilities through experience.	Children do not learn the skills correctly just by trial and error.	Coaches must be able to provide a correct demonstration of the basic skills required at this level.
Imagination is blossoming.	Experimentation and creativity should be encouraged.	While practicing encourage input (opinion) from the children. They love to try new things and are ready to try almost anything.

Emotional Development Characteristics and their implications

Basic Characteristics	General consequences: performance capabilities and limitations	Implications to the Coach
The child’s self concept is developing through experiences and comments from others.	Youngsters perceive these experiences as a form of self-evaluation: “I am a good person if I do well, I’m a bad person if I do poorly”.	On a regular basis they need positive reinforcement from the coach. This will provide strong motivation to continue with the activity.
Children like to be the centre of focus and attention.	When a situation becomes threatening, they quickly lose confidence	Select technical and tactical activities in which success is virtually guaranteed. Gradually progress from simple to complex.
The influence of peers becomes a very strong driving force behind all activities.	Acceptance into the peer group often depends upon one’s abilities in physical skills and activities.	At this phase the coach must be capable of assessing properly the basic skills and providing a varied repertoire of practical opportunities for technical and tactical development, and improvement.
The child begins to understand the need for rules and structure.	They can understand and play simple games with simple rules and will tend to question rules and expect thoughtful answers.	Participation and fun to be emphasized rather than winning. Focus on the processes not on the outcome (and have lots of FUN)!

Adolescence – Early Puberty

Physical Development Characteristics and their implications

Basic Characteristics	General consequences: performance capabilities and limitations	Implications to the Coach
Significant proportional changes occur in bone, muscle and fat tissue.	During growth spurts adaptation is influenced by sudden changes of body proportions	Monitor training carefully and individualize the content of training to ensure adaptation.
Girls begin their growth spurt between the ages of 10-14 years, boys between 12-15 years. Girls attain a maximum rate of growth at an average age of 11 years, boys at an average age of 14 years.	Early in this phase, girls are faster and stronger than boys; later in the phase boys become faster and stronger than girls.	Chronological age may not be the most appropriate way to group fencers
Primary and secondary sex characteristics manifest themselves during this period. The normal range for onset of menarche for girls can be anywhere from 10-16 years.	After the onset of menarche iron levels of girls should be monitored regularly.	Situations where fear, guilt or anxiety is brought about by sexual development should be avoided.
Smaller muscle groups are becoming more developed.	Speed, agility and co-ordination are still improving rapidly during this stage.	With the improvement of fine motor movement all basic technical skills should be mastered. Fencers should learn how to train, during this phase, including physical, technical, tactical and ancillary capacities.
During this developmental phase the various parts of the body do not grow at the same rate. The growth rate of the legs and arms will reach a peak prior to that of the trunk.	A change in the centre of gravity, length of limbs and core strength will determine the content of training.	Some of the skills that may already have been learned may have to be refined (re-learned) again, since the growth of limbs will impact the technique.
A significant increase in red blood cells occurs during this phase, especially in boys due to the male hormone testosterone.	The oxygen transportation system is still developing and aerobic endurance is continuing to increase.	The increase in body mass requires more structured aerobic training. Only short duration of anaerobic activities are recommended. Aerobic activities should still have an interval training basis here, e.g. not too many long steady-pace runs.
The central nervous system is almost fully developed.	Agility, balance and coordination are fully trainable.	Use the warm up to development further central nervous system activities.

Mental/Cognitive Development Characteristics and their implications

Basic Characteristics	General consequences: performance capabilities and limitations	Implications to the Coach
Abstract thinking becomes established more firmly.	Decision-making through more complex technical training should be introduced.	Decision-making on tactical and strategic solutions should be based upon the skill level of the fencer.
Young people develop a new form of egocentric thought. Much emphasis is placed upon self-identity.	This may result in a strong fear of failure.	Create optimum learning environment, match skill and drill levels. Introduce simple coping strategies, concentration skills and mental imagery.
Young people are eager to perfect their skills.	Individual, specific direction and structure in the learning process is required. A variety of methods to measure success are important to maintain motivation.	Positive reinforcement is imperative. The difference between the physical and mental development can vary considerably, the coach must be particularly careful not to pick the early developers and neglect or de-select the late developers. The coach's ability to demonstrate specific skills is important. Audiovisual material and video feedback will help to create a mental image.

Emotional Development Characteristics and their implications

Basic Characteristics	General consequences: performance capabilities and limitations	Implications to the Coach
There is a tremendous influence on behaviour from peer groups.	Values and attitudes are being created and reinforced by the group.	The Coach should exercise strong direction and supervision. A role model for young fencers at this phase is very important.
During this phase young people are capable of co-operating and accepting some responsibility	Some fencers may be less responsible, due mainly to a fear of failure.	The Coach must have open communication with the fencers.
Tension generally exists between adults and adolescents.	Communication channels should be kept open by the adult, as all teenagers need help even though they do not recognize the need, or seem grateful for the help.	The Coach is usually better accepted than other adults and should always attempt to foster two-way communication. Young fencers should have an input into the decision-making processes.
It is important that young people at this developmental level are able to display tenderness, admiration and appreciation.	Deprivation of these qualities often leads to exaggerated and/or unacceptable behaviour.	Early maturers often become leaders and excel in physical performance. Coaches must not play favourites as this can have negative effects on the development of other participants.
Physical, mental and emotional maturity do not necessarily develop at the same rate.	Feelings of confusion or anxiety may exist as a result.	The coach's communication skills and understanding are important.
There is a desire to have friends of the opposite sex.	Social activities are important events for this age group.	Co-educational activities are recommended.

Adolescence – Late Puberty

Physical Development Characteristics and their implications

Basic Characteristics	General consequences: performance capabilities and limitations	Implications to the Coach
The circulatory and respiratory systems reach maturity.	These systems are generally capable of giving maximum output.	Aerobic and anaerobic systems can be trained for maximum output. Full sport specific energy system training should be implemented.
Increase in height and weight gradually lessen. Stabilization occurs in the muscular system.	Muscles have grown to their mature size but muscular strength continues to increase reaching its peak in the late twenties.	Strength training can be maximized to improve overall strength development. Neuromuscular training should be optimized during this phase.
Skeletal maturation continues in males and females.	Connective tissues are still strengthening.	Progressive overloading in training should be continued.
By age 17, girls have generally reached adult proportions, whereas boys do not reach such proportions until several years later.	Proportionally girls gain more weight than boys during this phase.	Aerobic training for girls to be optimised. Coaches should be aware of how to deal with weight gain and its impact on figure. Fencers should learn how to compete including all technical, tactical and ancillary components.

Mental/Cognitive Development Characteristics and their implications

Basic Characteristics	General consequences: performance capabilities and limitations	Implications to the Coach
Generally, by age 16, the brain has reached its adult size but continues to mature neurologically for several more years.	Fencers can cope with multiple strategies and tactics, particularly near the end of the phase.	Coaches should ensure the refinement of all technical and tactical skills.
Critical thinking is developing well during this phase.	The capacity of self-analysis and correction is developing.	Decision-making should be developed further through technical and tactical development.

Emotional Development Characteristics and their implications

Basic Characteristics	General consequences: performance capabilities and limitations	Implications to the Coach
Peer group influence is still a powerful force.	Independent decision-making and leadership skills are becoming more developed.	Fencers should be given the opportunity to develop through participation in appropriate leadership or responsible roles, (i.e. team captain, athlete representative, etc.) but strong direction and discipline must be maintained.
Young people are searching for a stable, balanced self-image.	The Self is still very susceptible to successes and failures. Coping techniques are useful.	Positive evaluation of performances and positive reinforcement are imperative.
Activities and interaction with the opposite sex play strong roles during this phase.	Male fencers must be aware that female athletes now face a problem of femininity versus sport development. Female fencers must be aware that male athletes now face a problem of relating performance to masculinity.	Facilitate the recognition of the former issues through education and club programmes.

Early Adulthood

Physical Development Characteristics and their implications

Basic Characteristics	General consequences: performance capabilities and limitations	Implications to the Coach
Physiologically the body reaches maturity during this phase.	All physiological systems are fully trainable.	Physical training programs should employ the most advanced techniques and sport science information to facilitate maximum adaptation and minimize injuries. Ensure that all muscle groups and body alignments are balanced well, complemented with optimum flexibility ranges. State of the art testing and monitoring programmes should be used. Over training and over stress should be carefully monitored.
Final skeletal maturation in females occurs at about 19-20 years and in males about three years later.		Regular medical monitoring should be organised with additional blood tests for female fencers (anaemia).

Mental/Cognitive Development Characteristics and their implications

Basic Characteristics	General consequences: performance capabilities and limitations	Implications to the Coach
Neurologically the brain matures about 19-20 years of age.	Fencers are capable of self-analysing, correcting and refining skills. Athletes can analyze and conceptualize all facets of their sport.	Winning becomes the major objective.
	Well-developed information processing skills improve the fencer's ability to visualize verbal instructions.	Principles of adult learning should be implemented at this level.
There is a complete understanding and acceptance of the need for rules, regulations and structure.	However, the young adult must perceive the rules and structure as being clearly defined and fair.	Involve fencers in decision making and planning of team or group activities.

Emotional Development Characteristics and their implications

Basic Characteristics	General consequences: performance capabilities and limitations	Implications to the Coach
There is a need to be self directed and independent.	Fencers are ready to assume responsibility and accept the consequences of their actions.	Goal setting should be emphasized to give definite direction and purpose to the fencer's overall programme.
Self-actualization and self-expression are important.		Fencers need to be treated as adults, with respect. Direction and structure provided by the coach is still important.
Major decision on career, education and lifestyle are priority at some point in this phase.	Major changes in interests, hobbies and physical activities occur during this phase.	Professional guidance should be made available considering off-season and educational pursuits.
Interactions with the opposite sex continue to be strong priority with lasting relationships developing.		Fencers must have ample opportunities for independent social interaction.

*It is important to stress that human growth and development happens without training, however training for sport(s) can enhance all of the changes that take place by effectively utilising periods of trainability.