UKA SPRINTS & HURDLES ADM V1.0

INTRODUCTION

Many coaches have requested guidelines surrounding long-term athlete development, specifically in relation to how to progress from when they first become involved in athletics through to international success. To meet this need UKA created the Athlete Development Model, which provided insight into how young athletes develop through puberty and the implications this has on training.

This document complements and builds upon the generic UKA Athlete Development Model by taking the core principles and applying them to the Sprints and Hurdles event group. Using current knowledge surrounding athlete development and the underpinning principles of competency based progression and deliberate practice, it provides a suggested model of how training could be progressed to maximise senior success.

Within this document we have included diagrams to graphically illustrate how key factors related to the Sprints and Hurdles could change throughout an athlete’s development. These diagrams are not intended to be interpreted without the accompanying information in this document. Where lines donating a change from one aspect to another at a specific age are included these should not be taken as definitive cut off point because this always relates to developmental age, which varies considerably from athlete to athlete.

Any model will always have limitations and the UKA Athlete Development Model is a growing document that will be expanded upon as new research and information is published.

In order for this document to meet your needs we require your comments and feedback so we can clarify any areas of confusion. These comments can be submitted using the feedback comment form at the bottom of this document:


For more information regarding athlete development in general be sure to check out the athlete development section on uCoach:

http://coaching.uka.org.uk/coaching/athlete_development/

ASSUMPTIONS OF THE MODEL

The UKA Sprints and Hurdles ADM assumes an athlete may move through a program from age 9 to 28 achieving a podium finish at the Olympic Games or World Championships.
We assume performance improves with training age. If an athlete enters the sport in more advanced years they may have to re-visit training components before moving onto more advanced topics but it may also be possible to develop a number of training parameters in parallel.

**Reading Notes**

This document should be read in conjunction with the UKA Athlete Development Model V1.2, which can be downloaded from the athlete development section on uCoach:


An audio presentation providing details about the model can be downloaded from uCoach:


A print version of the UKA Athlete Development Model can be downloaded from uCoach:


In addition to the above information you may wish to read the document ‘Classifying Sprint Training Methods’ by Tony Lester, Michael Khmel and Tom Crick:


In addition you may also like to read the 8 part strength training series (Defining Strength, Maximal Strength Part 1 & 2, Special Strength Part 1 & 2, Specific Strength, Strength Development for Young Athletes Parts 1 & 2) by Derek Evely and Tom Crick, which can be accessed from the ‘Performance Sciences’ section of uCoach:


**DEFINITIONS**

**Absolute Intensity**

 Absolute Intensity refers to the level of performance in any given task relative to the absolute limits of human performance. In running events, the quicker the time the higher the absolute intensity. In jumping and throwing events, the greater the distance the higher the absolute intensity. In physical preparation activities the heavier the weight lifted or the greater the power output the higher the absolute intensity. As a result male athletes tend to exhibit high absolute intensities than females and adults higher absolute intensities than children.
Ancillary Strength

Ancillary Strength exercises typically fall into the GPE category of the exercise classification hierarchy. They are exercises that typically performed in the 10-15 rep range using light resistance such as dumbbells or rubber bands. In many ways they resemble traditional ‘bodybuilding’ training for increasing the CSA of muscle.

Block Method

A method of organizing training where a classification category or group of categories of exercises (GPE, SPE, SDE, CE) is performed to the exclusion of another category or group of categories throughout the training period.

Bone Mineral Density (BMD)

A measure of the hardness of bone, reflecting the amount of calcium present in a given area. Tests for BMD are used to evaluate bone health and fracture risk.

Chronological Age

Chronological age refers to “the number of years and days elapsed since birth.” Chronological age is not necessarily a predictor of an individual’s stages of development, as children of the same chronological age can differ by several years in their level of biological maturation.

Complex Variation Method

A method of organizing training where all categories of exercises (GPE, SPE, SDE, CE) are carried out simultaneously but the exact exercises used is varied throughout the training period.

Development Age

Developmental age can be multifaceted and refers to the degree of physical, mental, cognitive, and emotional maturity. Unlike chronological age, children of the same developmental age will exhibit similarities in terms of their level of physical, mental, cognitive and emotional development.

Eccentric Muscular Contraction

A muscular contraction that occurs as the muscle length is increasing. Eccentric contractions produce greater forces than other types of muscular contraction.

Full Recovery

A rest interval that is long enough for the athlete to be capable of performing the next repetition in the same time or faster than the last without an increase in perceived effort. If the athlete is unable to reproduce the previous performance then the rest generally needs to be extended. As a rule of thumb a rest interval of 1-2 minutes per second of high intensity sprinting is advisable.

General Strength

General Strength exercises typically fall into the GPE category of the exercise classification hierarchy for speed-power athletes and either the GPE or SPE category for endurance athletes. They include exercises
typically performed in the 10-30 rep range using bodyweight only or very light resistance such as a medicine ball. Typical examples include push ups, pull ups, walking lunges etc.

**Long to Short**

A strategy for the development of speed, speed endurance and specific endurance that starts with long distances and progresses to short distances.

**Maximal Strength**

Maximal, or absolute, strength is the ability to produce large amounts of force with a single concentric muscle contraction. Maximal strength does not relate to time constraints, so the amount of time required to develop force is not a consideration. Maximal strength also does not take into account the athlete’s body weight.

**Physical Preparation**

Physical preparation is any type of training that addresses the physical elements (physical fitness) of sports such as mobility, flexibility, strength, speed, power, acceleration, deceleration, dynamic vision, reaction time, and recovery. All of these elements need to be addressed to help best prepare an athlete or team for successful sports competition.

**Mental Preparation**

Mental Preparation involves any strategies that assist the athlete to execute technical skills and make use of all necessary physical potential when necessary. Mental preparation should allow optimal performance in both competition and training.

**Peak Height Velocity (PHV)**

Peak height velocity (PHV) is the maximum rate of growth in stature during growth spurts.

**Relative Intensity**

Relative intensity refers to the intensity of an activity relative to one's own maximum potential at any moment in time. For example, in the Shot an athlete who can throw 20m is throwing at 50% relative intensity when they launch the shot 10m. In the 100m sprint an athlete that could cover the distance in 10s is working at 50% relative intensity when they cover the distance in 20s.

**Roll Over Starts**

A method used to start a rep where an athlete begins upright and rolls forward to a 45 degree angle before pushing off. The method approximates starting from blocks but without the additional effort of having to raise the centre of mass.

**Short to Long**

A strategy for the development of speed, speed endurance and specific endurance that starts with short distances and progresses to longer distances.
**Speed**
Sprints at greater than 95% relative intensity lasting up to a maximum of 7s where FULL recovery is taken between reps.

**Speed Endurance**
Sprints at greater than 95% relative intensity lasting between 7-15s conducted with FULL recovery between reps.

**Specific Endurance**
Sprints at greater than 95% relative intensity lasting longer than 15s conducted with FULL recovery between reps.

**Specific Strength**
Exercises that replicate the whole or part of the competitive event but with added resistance. Examples include resisted sprints for sprinters, hill training for endurance athletes and throwing a 1kg ball for a javelin thrower.

**Special Endurance**
Sprints at greater than 95% relative intensity conducted with INCOMPLETE recovery between reps. A classic example of special endurance training are ‘split runs’ such as 3x60m with two minutes recovery for a short sprinter or 300m, one minute recovery 100m for a 400m runner.

**Special Strength**
Special strength methods are those that make use of the elastic properties of the human body and involve eccentric muscular contractions. When implemented in training they typically use non-maximal loads and develop one or more of the following characteristics - reactive strength, explosive strength, power, or speed-strength, rate of force development. They may also include various proprioceptive and re-educating type activities including corrective and stabilizing type movements.

**Stage Method**
A method of organizing training where a classification category or group of categories of exercises (GPE, SPE, SDE, CE) is performed throughout a training period.

**Starting Strength**
The ability for muscles to develop force at the beginning of a working contraction before movement occurs. This is best demonstrated when an athlete is attempting to overcome inertia by accelerating a mass from rest. Examples of starting strength are sprinters coming out of the blocks or weightlifters generating the force to begin to move the weight at the beginning their lifts.

**Steering mechanisms (in hurdles and jumps)**
A term used to describe the visual cueing strategies used by athletes to assess take off distances in jumping events. An athlete that is good at steering will take off in the optimal position to clear a barrier.
or maximize jump length or height. Achieving this optimal take off position is a matter of practice and can be influenced by what the athlete looks at (such as the front or back of the take off board, the upright in high jump or the cross bar in hurdling) and consciously or subconsciously thinks about while executing a take off (such as do I put my toe or my heel on the board or take off point).

**Training Age**

*Training age* refers to the number of years since the athlete began formal structured training in Athletics.
SPRINTS & HURDLES TRAINING AND COMPETITION PROGRESSIONS

In this section we will describe the key changes to training and competition that occur as an athlete who has decided to focus on the sprints and hurdles develops.

These guidelines are designed to accompany the generic UKA Athlete Development Model and provide greater event specific detail in relation to sprinting and hurdles. Central to the philosophy of long term athlete development is the concept of ‘competency based progression’, where the athlete is not progressed to more challenging aspects of training until they are able to demonstrate that they have mastered underpinning principles. In the sprints and hurdles a key component of high-level senior performance is fluid movement, efficient mechanics and relaxed execution and so progression of skills should be based around an athlete’s ability to perform workouts in this manner.
# S&H Athlete Development Model (V1.0)

## Developmental Age +/-

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<td>Post-Puberty</td>
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## Development Focus

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<th>Development Focus</th>
<th>Running Mechanics + Physical Preparation</th>
<th>Running Mechanics + Special Strength</th>
<th>Speed End + Special End/Specific End</th>
<th>Acceleration + Max V Specific Endurance</th>
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<td>Perfection of Specialist Technical Development for Senior Specification Short or Long Hurdles</td>
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<td>CE</td>
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<td>Accel, Max V, Speed End</td>
<td>Accel, Max V, Speed End, Special End, Specific End</td>
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<td>CE Distances / Hurdle Flights</td>
<td>&lt;100m 4-6 Hurdles</td>
<td>&lt;150m 4-8 Hurdles</td>
<td>&lt;250m 6-10 Hurdles</td>
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<td>Resisted, Assisted (Wind Only) Intensive Repetition, Extensive Repetition</td>
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* = Preferred competition distances given current physical attributes

Note: These diagrams are for illustration purposes only. They can only be fully interpreted after reading the accompanying notes and audio presentations.
Developmental and Chronological Age

**Developmental age** refers to the degree of physical, mental, cognitive, and emotional maturity. Physical developmental age can be determined by skeletal maturity or bone. For coaches this is best assessed in relation to the rate of growth of the individual.

**Chronological age** refers to ‘the number of years and days elapsed since birth.’ However the rates of growth, development, and maturation vary greatly between individuals and so children of the same chronological age can have very different levels of biological maturation. Since many of the social aspects of our lives, such as when we begin school, and when we are legally considered an adult (18 in the UK), are related to chronological age it is included in the UKA Athlete Development Model. However the majority of the key considerations in the coaching of developmental athletes are more appropriately addressed after assessing the developmental age of the athlete.

Stage of Development

For the purpose of simplicity UKA have divided the development of a child up into four key stages:

- Pre-puberty: prior to the release of sex hormones where the child is growing steadily
- Puberty: the period of rapid grow that accompanies the release of sex hormones
- Post-puberty: the period of steady decline in growth that occurs after the initial onset of puberty
- Adulthood: The period of cessation of growth where physical maturation is completed.

Sports Focus

**Multi-Activity:** Up until the age of around 12 all children should ideally be engaged in multiple sports with little specific focus on one over the others. This period coincides with the periods of rapid skill acquisition for both girls and boys, where the broadest range of sports possible will allow the young athletes to rapidly pick up all the fundamental movement patterns required for training in the future.

**Multi-event:** From the age of around 12-16 young athletes should be exposed to a range of Athletics events across as many event groups (running, jumping and throwing) as possible. At this stage in their development it is very difficult to predict what event or even event group the athletes may be best suited to when they are fully mature. Furthermore, as a fully mature athlete, regardless of event, their training will to some degree involve a variety of running, jumping and throwing activities and so a background in a range of events will provide a solid foundation for the future.

**Sprints & Hurdles Event group:** around the ages of 15-16 athletes will probably begin to focus on a specific event group (in this case the Sprints & Hurdles) as they begin to realise where their potential and interests lie. At this point the athlete should focus both sprinting and hurdling so as to develop a good all round event group specific conditioning and co-ordination base.

**Sprints or Hurdles Event Specialisation:** as the athlete approaches full maturity they will probably begin specialising in a single or perhaps two closely related events (100/200m, 400m, Short Hurdles, 400mH). If they have gone through a suitable progression from multi-sport to multi-event to event group they
will have acquired a strong foundation in terms of conditioning and run, jump, throw specific skills from which they can now draw upon to improve performance in the sprints or hurdles.

Note: those entering the sport late at 18/20 may have to revisit some of the skills required to train. However, they will probably have being doing other sports where they may have developed many of these abilities (for example cricket for throwing, basketball for throwing and jumping, team sports for running, cycling or swimming for endurance etc).

**Competition Focus**

The competition structure currently employed within the UK uses an age group structure that does not take into consideration the wide variation in growth and maturation among athletes. With this in mind, some of the competition distances available to the young athlete are unsuitable for the majority of individuals because they require levels of speed endurance and specific endurance that cannot be obtained until the lactic energy pathways are fully mature and the athletes have adequate strength levels.

Before the age of 12, runs in excess of perhaps 75m cease to be sprinting, as most young athletes cannot produce the power output to sustain sprint mechanics for such a long duration. The same can be said of runs greater than 100-150m for the majority of athletes of younger than 15 years. Please note this does not mean that athletes at young ages are physically incapable of running further distances. Instead, it points to the reality that in order to complete such events young athletes will employ very different pacing strategies and use different physiological systems to those they will employ as senior performers. Instead of sprinting, many of these events represent a challenge more akin to middle distance.

Therefore, when providing guidance for aspiring young SPRINTERS, it is perhaps prudent to suggest they participate in and focus on the shorter distances until maturation permits the move to more extended events. The rule of thumb when making such a judgement call is can the athlete maintain excellent mechanics for at least 80-90% of the race. If they cannot then what are they achieving by competing at that distance? Why not instead chose a distance that allows them to practice in a competitive environment AND use good technique. Note that this does not mean athletes cannot race the longer distances on occasion but rather that the focus of both training and competition should be on raising performances in events that provide the environment for athletes to be competitive while still utilising excellent technique.

With the above in mind, levels of the performance structure below the competitive exercise should be updated to reflect the limitations in the athlete’s abilities. For example, extensive and intensive running work at the Specific Development Exercise level (SDE) may be restricted to distances of perhaps 80-150m for young athletes whereas seniors may use distances up to 600m or more on occasion.

**Starting Blocks**

Starting blocks are used in the sprints and hurdles to aid the athlete in overcoming inertia at the beginning of the race. They are also used in high-level competition to check for false starts. Unlike
running, which is a natural human movement, the ability to use starting blocks is a learned skill. Skills can only be mastered if supporting qualities such as strength and mobility are also sufficiently developed. In terms of block starts, strength is a key underpinning quality. Without adequate levels of strength athletes will find technical ‘solutions’ that allow them to overcome their strength deficit by for example stepping out in front of themselves on the first few steps or by adopting projection angles that are higher than desirable for optimal performance. Over time these undesirable movement patterns will become habit and it will be very difficult to relearn these skills even when their strength levels are adequate. Therefore, the decision to introduce starting blocks must be based on physical competency.

**NO:** For athletes under the age of 12 there is no reason to introduce this complex skill. Instead time should be spent on the fundamentals of running, jumping and throwing.

**YES BUT - only when strength levels permit good technique:** once athletes have mastered roll over starts on hills and the flat as well as crouched starts on the track in spikes, then consideration can begin as to when starting blocks should be introduced. A good background in jumps and throws will help develop adequate levels of starting strength either through event related technique (shot, long jump etc) or multi-jumps and multi-throw. As a rule of thumb, the athlete is ready to use blocks if upon being introduced to them it feels ‘natural’. If the athlete struggles with the technique then they should continue technical and physical development through existing means and return periodically (every couple of months) to the starting blocks where progress can be assessed.

**YES:** Senior athletes will need to practice using starting blocks in order to compete in high-level competition where their use is mandatory. If a sound progression of technical and physical preparation is followed throughout puberty and post-puberty then most athletes should find block starts natural by the time they move to senior competition.

**Development Focus**

The focus in terms of development of hurdlesing and sprinting related skills needs to change in accordance with the athlete’s physical development needs.

**Running Mechanics + Physical Preparation / Hurdling Mechanics & Technical Development:** While the athlete is engaged in Multi-Sport and Multi-Event work then any focus as it relates to sprinting and hurdling should be based around installing good quality running and hurdling mechanics as well as physical preparation which will come primarily from the range of different sports and the events within Athletics that they are participating in.

When it comes to hurdling, the hurdle spacing and height should be adjusted to accommodate the individual athletes physical development. The optimal settings will be those that facilitate technical development both in terms of hurdle clearance and running between the barriers.

**Running Mechanics, Special Strength:** As athletes begin to specialise in the sprints and hurdles event group an emphasis on special strength work (mainly through multi-jumps and multi-throw) will need to be added to offset the loss of these skills now that they are no longer engaged so frequently in multi-events and other sports. The focus on running mechanics should also continue, as athletes will
continually need to fine-tune their skills as they mature into their adult body shape. This is especially important for female athletes who undergo the greatest fluctuation in body shape during puberty.

**Further Technical Development aligned to Physical Development:** For male hurdlers, while the 2’9” (84cm), 3’0” (91.4cm) and 3’3” (99.1cm) hurdles used during competitions at the U15, U17 and Junior age groups are useful to introduce the skill of hurdling to developing athletes they typically favour the smaller more powerful athletes (or simply those with shorter legs relative to their torso) who do not have to chop their stride in order to use a three stride rhythm between the barriers. Meanwhile the taller (or longer legged) athlete may struggle to take small enough step to be competitive in competition during this period but are better suited to the dimensions used in the senior 3’6”(107 cm) races.

Therefore, taller athletes may begin to focus on developing technique over the senior 3’6”(107 cm) barriers earlier in their development than the smaller athlete who will have to wait until their height or physical capacity permits them to practice clearing the senior barriers with good technique. During the transition from 3’3” (99.1cm) to 3’6”(107 cm) barriers both taller and shorter athletes may spend some time practicing over both heights. However, the ratio of practice at each height may vary between the two groups with the taller athlete spending a greater proportion of the technical practice working over the higher hurdles.

Female athletes can vary widely in ability at younger ages. On one hand at U15 and U17 level some female athletes with fairly low power capabilities may struggle to make a three stride rhythm between the barriers and the eight strides to the first hurdle, while at the other end of the spectrum the powerful early maturing female may have to switch to a seven stride run up to the first hurdle at U15 and U17 age group so as not to crash into the barrier! Therefore, with developing female athletes it is especially important to adjust the barrier height and spacing to fit their physical capacity. While females may race over the low 2’5” (76.2cm) barriers for the sake of competition, they should only get serious about competing when they are physically capable of running over the high 84cm barriers. Like male athletes, once the female’s physical capacity allows them to clear the high 84cm hurdles without compromising technique (such as excessive breaking into the hurdle or jumping to clear the barrier) then they should begin shifting the majority of their technical hurdling work to focus on developing the skills and timing associated with being competitive in the senior specification 100mH event.

Having acquired proficient hurdle clearance mechanics athletes should also experiment with developing good rhythm between hurdles using a variety of both odd and even stride patterns. This will help them to develop the steering mechanisms (ability to judge take off distance) required for both the long and short hurdles while they continue to work on hurdle take off and clearance mechanics. Once athletes begin to move to the senior specification sprint hurdle heights they can reserve the work over lower barriers for such rhythm work.

**Perfection of Specialist Technical Development for Senior Specification Short or Long Hurdles:** As athletes move into the event specialisation phase and are now focused primarily on hurdling they can begin to focus their rhythm work around the events they are going to compete in, which will usually be either short or long hurdles. Having already solidified their technique they can also continue to
challenge and refine their speed maintenance over the barriers through the use of further flights of hurdles during practice.

**Speed End + Special End/Specific End, Max Strength and Special Strength:** In terms of sprint events as athletes begin to specialise they will start to place more emphasis on the qualities specific to their chosen events. This will include speed, special and specific endurance work in a ratio that is appropriate for the events (100m, 200m and 400m) over which they intend to compete as well as what they individually respond to best. This is also the stage where maximum and special strength qualities are best developed to the necessary levels in accordance with the athlete’s needs and abilities.

**Acceleration + Max V, Specified Endurance:** As athletes reach full maturity and begin to reach their highest levels of performance (usually from 23 years old and onwards) the focus of training will need to be adjusted to the areas that are most important for success in their respective events. For short sprinters this will be acceleration and maximum velocity work, while for athletes competing over 200m and 400m it will also include the perfection of specific endurance.

**Competitive Exercises (CE) & CE Distances / Hurdle Flights**

A key factor in to consider when implementing the general development strategy outlined under ‘Development Focus’, regards the progression of distances that are selected for the specific high intensity sprinting and hurdling that falls under the Competitive Exercise category of the Exercise Classification Hierarchy. Such work includes all sprinting and hurdling performed at greater than 95% intensity and should be performed with excellent technique and relaxation at all times.

**Acceleration, Max Velocity / <100m 4-6 Hurdles / <150m 4-8 Hurdles:** While athletes are emphasising the development of general running and hurdling mechanics the focus with Competitive Exercises should be restricted to work associated with acceleration and maximum velocity, rather than endurance, both with and without barriers. Mastery of the technical elements associated with the initial phases of both sprints and hurdle races will require a great deal of perfect practice and to ensure the athlete is able to execute the sprinting and hurdling action in a relaxed fashion, distances and the number of hurdle flights should be chosen that facilitate this.

It is therefore, recommended that until the age of 12-13 years old an athlete be restricted to sprints of less than 7s in duration (typically less than 50m) and 4-6 flights of hurdles. Having gone through puberty and the associated changes in lactic and aerobic energy systems (a reduction in the predominance of the aerobic system) as well as biomechanical energy return (increased strength of bone and tendons), athletes can then begin to use more extended distances. While on occasion athletes may perhaps run out to 150m (typically less than 20s in duration) by the age of 15, provided excellent technique is maintained throughout every run, the focus should continue to be placed on acceleration and maximal velocity work. The reason short distances are emphasised in this development model is because runs of this length can be easily monitored by the coach from a single vantage point (as the athlete is never far away) and by avoiding excessive fatigue excellent high intensity movement patterns can be easily perfected. Fitness and endurance requirements can then be addressed through other modalities that do not interfere with skill learning, for example general preparation exercises (GPE), which can include
cross training modalities such as rowing or bike workouts. From a hurdling perspective the number of flights used in training can be increased in line with the athlete’s physical capacity if appropriate. Those athletes that can run with good technique for 6 hurdles may benefit from the challenge of negotiating 7 or 8, while those athletes who have not yet mastered the skills should continue using 4-6 hurdles until they are ready to progress.

Throughout the periods of rapid growth that occur during puberty it should be remembered that athletes will constantly be adjusting to their ‘new’ bodies and this is why the skills of accelerating, sprinting and hurdling with perfect upright mechanics need to be constantly readdressed. This is especially important for female athletes who can experience significant changes in body mass and so it cannot be assumed that training progressions will always be moving forwards. Instead female athletes will often have to retrace their steps before moving forwards and so coaches should always be on the look out for a reduction in competence which signals the need for skills to be readdressed.

Similarly the dynamic flexibility required to successfully negotiate hurdles needs to be carefully maintained through both hurdling practice (CE) as well as through mobility exercises (GPE). A loss of technique during a growth spurt may require coaches to check mobility levels are still adequate for optimal technique and if they have declined this issue needs to be addressed and competency reassessed before the athlete is progressed to more challenging training.

**Acceleration, Max Velocity, Speed End / <250m, 6-10 Hurdles:** Once the rate of growth has slowed and the athlete has mastered good sprinting and hurdling mechanics in their mature body shape they may begin to work on maintaining their excellent technique for more extended periods of time. Therefore, once they begin focusing on the sprints and hurdles event group they can start to undertake speed endurance and special endurance sessions in a progressive manner. During this time athletes may be able to execute runs above 95% intensity lasting up to around 30s (typically up to 250m) in length with excellent form.

In terms of hurdling practice, rhythm work for the short and long hurdles, using varying stride patterns, can follow similar guidelines with progression matched to technical competency. During this time the number of consecutive hurdle flights can be increased in a progressive manner out to perhaps 6-10 barriers.

**Accel, Max V, Speed End, Special End, Specific End / All Distances, 8-12 Hurdles:** As the athlete becomes fully mature and begins to specialise in either sprints or hurdles they can simultaneously be introduced to longer repetition distances, provided they can demonstrate good technical execution and specific endurance work can be safely added to their programme. So long as competency permits, developmentally they will be capable of completing runs over all distances that fall within the parameters of high intensity sprint work. In terms of hurdle progressions the number of flights can be extended further and 8-12 flights can be used to begin to perfect the speed maintenance qualities in these events.

By this point in their development athletes should be prepared to undertake a progression strategy (for example the ‘stage’ method, the ‘block’ method or the numerous ‘complex variation’ methods – the
most common of which are often referred to in sprinting as long to short and short to long) that best matches their physical and mental qualities as an athlete. These generic strategies are described in more detail in the Event Group and Event Specialist coaching qualifications.

**Specific Development Exercises (SDE)**

SDE exist to develop qualities required to undertake the competitive exercises. Therefore, their progression is dictated primarily by how the athlete is developing in relation to CE work.

N/A: For young athletes involved in Athletics 365 and Multi-Sport activity there is no need to overload any specific qualities as the focus is firmly on technical skill development.

**Hills, Extensive Repetition:** Athletes who are older than perhaps 12, may benefit from Specific Development Exercises that support the Acceleration and Maximum Velocity work being carried out at the CE level but do not require the bodily systems that develop during puberty to be fully mature.

Since athletes are still developing their technique at this stage of their evolution it would be inappropriate to challenge their skill levels further by introducing assisted running of any kind. However, resisted work in the form of short hills can facilitate the development of acceleration mechanics, even for athletes with limited strength levels.

Furthermore, while athletes going through puberty can specifically target development of the lactic system it is perhaps unwise to attempt to do this through running based activity as the resultant fatigue will impair technical development and can also place them at risk of injury as mechanics deteriorate.

Therefore, intensive repetition work should be excluded from the programme during this time and safe alternative non-running based methods such as cycling on a stationary bike, swimming or general strength circuits can be used to develop these qualities if desired. Since an athletes’ aerobic metabolism predominates during this timeframe Extensive Repetition work in conservative amounts may be employed provided that excessive fatigue is not induced.

The take home message is use methods that are developmentally appropriate but do not interfere with the naturally unstable and immature running mechanics and so could adversely affect skill learning.

**Resisted, Assisted (Wind Only), Intensive Repetition, Extensive Repetition:** As athlete’s technique is solidified they can progressively be exposed to more demanding challenges. Resisted running work can be expanded to include light sled work or other lightly resisted runs, which if performed carefully can help to support and develop excellent acceleration mechanics.

In terms of Assisted running, athletes can be exposed to sprints with the wind at their back to subtly overload the speed component of maximal velocity running technique. Conservative amounts of intensive repetition work can also be introduced provided solid technique is maintained and extensive repetition work can continue to be developed as the athlete becomes used to handing higher volumes.

**Specific Strength, Resisted, Assisted, Intensive Repetition, Extensive Repetition:** As athletes become fully mature both physically and technically all means of specific development can be employed.
including specific strength work and various forms of assisted running (though prudence is always appropriate regarding this method as technical breakdown is common even among elite level athletes).

**Special Preparatory Exercises (SPE)**

**N/A:** While athletes are involved in Multi-Sport and Multi-Event development special preparatory work is replaced by running, jumping and throwing activities, which may include competitive exercises from numerous event groups (such as shot, javelin, long and high jump).

**Special Strength (inc. MJs and MTs):** As athletes begin to specialise in the Sprints and Hurdles event group SPE work will now be expanded to include less technically focused jumping and throwing activities. This will predominantly come from Multi Jump and Multi Throw circuits although other developmentally appropriate special strength exercises can also be used – see the UKA ADM for further generic details.

**Max Strength, Special Strength, Strength Endurance:** As athletes mature and become technically proficient with the use of various strength training exercises they can be exposed to the fully array of different maximal and special strength activities in a progressive competency based fashion. Strength Endurance work can also begin where appropriate.

**General Preparatory Exercises (GPE)**

**Athletics 365, General Strength (GS), Ancillary Strength (AS):** At the GPE level, all manner of exercises can be employed to improve an athlete’s general fitness and co-ordination. Initially this will come from a focus on General Strength work and also Ancillary Strength work as well as resources on balance and co-ordination etc found in Athletics 365.

Ancillary Strength exercises are typically performed using light resistance such as dumbbells or rubber bands for between 10-15 reps. In many ways they resemble traditional ‘bodybuilding’ training for increasing the CSA of muscle. In contrast General Strength exercises are typically performed in the 10-30 rep range using bodyweight only or very light resistance such as a medicine ball.

**All General Preparatory Activities (inc GS, AS, Mobility, Extremity Conditioning, Core Work etc):** As athletes begin to specialise in the Sprints and Hurdles GPE will increasingly include items such as targeted mobility work, core work and exercises aimed at conditioning the lower extremities such as sand pit foot conditioning.

**Running Drills**

**As part of Athletics 365:** Early on in an athletes development work on running drills will be included as part of their warm up in a multi-sport or multi-event focused programme such as Athletics 365.

**Learning technique:** As athletes begin to specialise in the Sprints and Hurdles event group they will begin to learn how to correctly execute specialist running drills aimed at improving core aspects of proprioception surrounding sprinting and hurdling technique.
**Perfection of technique:** Having learned how to correctly execute running drills, mature athletes can begin to master and perfect their execution as well as progress their challenge through increasingly greater attention to detail and relaxation.
PERFORMANCE STRUCTURE PROGRESSIONS THROUGHOUT DEVELOPMENT

A ‘performance structure’ outlines all the exercises or groups of exercises that are used in training. Performance structures help coaches to visualise how exercises used in training contribute to performance and affect recovery.

A performance structure is best depicted graphically using a pyramid structure where the event or events being trained for are positioned at the top. The exercise classification hierarchy can then be used to group exercises together in levels below the pyramids peak, moving from the most specific at the top through to the most general towards the bottom.

Sitting just below the reference event are the Competitive Exercises (CE) since they are the most specific, followed by the other three exercise classifications – SDE, SPE and GPE in order of specificity. An example performance structure is illustrated in the graphics below.

As we have seen from the Sprints and Hurdles Competition and Training Progressions, as athletes develop and move from an emphasis on Multi-Events to Event Specialisation the performance structure as it relates to sprints and hurdles will also grow and develop. This is best illustrated by looking at how a
performance structure focused on the Sprints would change as the athlete moves from the Multi-Event Stage of Athlete Development through to the Event Specialist Stage.

**SPRINTS SPECIFIC PERFORMANCE STRUCTURE DURING THE MULTI-EVENT STAGE**

A performance structure focused purely on the Sprints is somewhat irrelevant during the Multi-Event Stage of Athlete Development because by its very definition this is the time when athletes are training for several different events simultaneously, hopefully across all of the event groups. However, for the purpose of understanding how exercise selection may change throughout an athlete’s development it is worth considering here.

During the Multi-Event development stage, all the qualities that would be developed at the SDE level in relation to sprints are already being covered through the event specific technical training itself, which includes explosive jumping (high jump, long jump etc...) and throwing (shot, javelin) Therefore, no additional exercises are required at this level of the performance structure.

At the SDE and CE levels the range of training methods will be restricted to those that are most appropriate given the event profile and physical development of the athletes during this development stage. However, at the very bottom of the pyramid there will be a wide range of very generic preparation activities that improve agility, balance, co-ordination as well as general and ancillary strength.

So during the Multi-Event stage of an athlete’s develop the performance structure will look pretty empty when we purely consider exercises that directly underpin sprinting or hurdling. An example of a performance structure relating back to purely the sprinting work done by an athlete during the Multi-Event Stage of athlete development.

*Note: Multi Event focused athletes will typically be training for a range of events across all event groups. For the purposes of illustration this diagram only shows exercises as they relate to the Sprints but in reality hurdling, jumping, throwing and endurance exercises would also be included in the training programme.*
SPRINTS PERFORMANCE STRUCTURE DURING EVENT GROUP DEVELOPMENT STAGE

As athletes begin to focus on a single event group, during the Event Group development stage, the performance structure begins to become more crowded as Specific Development Exercises are added to compensate for the loss of explosive jumping and throwing that was previously coming from the athlete’s event specific technical work (high jump, long jump, shot put, discus etc). Furthermore, additional exercises can be added to the CE and SDE levels of the pyramid as the event profiles change and the athlete’s physiology and skill development mature.

So during the Event-Group development stage the performance structure relating back purely to sprinting may expand, especially at the SPE level, as illustrated below.

*Note: Event Group focused athletes will typically be training for both Sprints and Hurdles. For the purposes of illustration this diagram only shows exercises as they relate to the Sprints but in reality Hurdle exercises would also be included.*
SPRINTS PERFORMANCE STRUCTURE DURING EVENT SPECIALISATION

Once athletes have finished maturing they will hopefully have undertaken a progressive and well structured development plan, which has taken into consideration the changes in their physiology and the event profiles – as outlined in the Sprints and Hurdles Athlete Development Model.

At this point they should be ready to begin using a full range of exercises across all four classification levels. However, even at this point some of the more advanced activities such as assisted sprinting may be reserved for the most advanced stages of their careers, or excluded all together from the performance structure. For example some coaches avoid multi-jumps (plyometrics) all together because of the associated risks while others avoid intensive tempo because they feel it requires an excessive amount of energy to recover from, while not being specific enough to be worth the investment.

A performance structure that includes all the exercises that may be used by an athlete during the Event Specialisation stage and builds upon our previous examples is illustrated below.