

ACTION STATEMENT

Long-term athletic development of Gaelic games players: an action statement

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OVERVIEW

For long term athlete development to have its greatest impact it must be as widely accessible as possible and only when implemented in clubs, schools, colleges and counties can this be achieved. This requires the development of an overarching structure to facilitate the integration of LTAD into the structures of all deliverers of Gaelic games. The goal of this 'Action Statement' is to present an evidence-based reference point, based on core principles, to guide the practice of coaches and key stakeholders who support the development of players at every stage of the GAA player pathway.



Figure 1. Gaelic games player pathway ¹¹

Introduction

Gaelic sports play a pivotal role in the Irish sporting culture and are a focal point of the Irish sporting calendar. The Gaelic Athletic Association (GAA) is Ireland's largest sporting organisation with over 2,200 clubs located in all 32 counties of Ireland. It also has an international presence on all five continents.²² The Association today promotes Gaelic games such as hurling, football, handball and rounders and works with two sister organisations – The Ladies Gaelic Football Association (LGFA) and The Camogie Association – to promote ladies' football and camogie respectively.

At the pinnacle of the sport is the inter-county All-Ireland championships, where about 1.5 million people attend the competitions, which traditionally run from May to September (although more recently the season has changed from March to July).²² The Gaelic games associations also oversee club competitions and thus provide opportunities for players to participate and compete at a range of stages across the player pathway (see Figure 1).¹²

In the light of this rich heritage, players are attracted by the opportunity to compete in

these historic competitions, while there is also a vested interest for the Irish counties to cultivate a depth of young sporting talent who can then feed into their senior teams at both club and county level.

Establishing systems and pathways that facilitate appropriate development is beneficial to individual players, Gaelic games clubs, counties and ultimately the associations themselves. These pathways have historically been built around sport-specific development, yet their ultimate effectiveness depends not only on optimising sport-specific enhancement, but on addressing the wider range of factors that ultimately affect performance, one of which is the development of athleticism.

Long-term athletic development

The concept of long-term athletic development (LTAD), which refers to the habitual and holistic development of athleticism over time to improve physical fitness and reduce injury risk, is generally espoused as the optimal approach to establishing such pathways.²⁴ This process also has the potential to enhance mental and physical health and well-being.⁴²

However, and crucially, although LTAD has a well-researched theoretical basis, it could be argued that the full impact of LTAD is yet to be realised.³¹ Ultimately, LTAD approaches only have impact when they are applied, practice, and this remains perhaps the biggest challenge.²³ Although there are many theoretical models of LTAD, along with several position statements attesting to its theoretical value, there is far less reporting of models that have been applied in practice. There is therefore a shortage of information as to how the challenges of applying the models in practice can be addressed.³¹

Consequently, if any LTAD structure is to have impact it must not simply be a theoretical edifice, but instead needs to be a dynamic working model addressing the challenges of practice and providing both structures and core principles around which stakeholders and practitioners can build effective, contextually applicable, LTAD programmes. As a result, any planned development must be an applied and organic process: it needs to be one that can be effectively integrated into the overarching Gaelic games player pathways and organisational structures, while also having sufficient flexibility to enable it to be implemented in diverse ways in multiple settings and contexts.^{31,32}

Therefore, this document will stand as an 'Action Statement', focusing on supporting and facilitating implementation in a Gaelic games context, rather than being a traditional position statement. Consequently, its approach is not to focus on the research basis of LTAD, but crucially to outline an overarching structure whereby LTAD can be integrated into the development structures of all Gaelic games in clubs, schools, colleges and counties. To achieve this, it has utilised the expertise of practitioners who have previously implemented LTAD systems across national and international sport; as a result, the Action Statement aims to be both theoretically sound and – crucially – practically relevant. Ultimately, the focus is on developing accessible grass roots friendly approaches, whereby LTAD becomes a living process, integrated into the systems and structures of player development at all levels of the game.

It is important to note that this Action Statement is designed simply to provide a framework for action, and not to outline specific activities. Over time, further specific resources for coaches will be

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produced which will outline practical means by which the goals and objectives outlined in the statement can be achieved. Underpinning this approach is the need to remember that any programme involving the development of young players needs to be engaging and child-centred. Coaches working within environments that balance challenge with fun and achievement and which enable children to flourish always stand a better chance of success. Indeed, the Irish proverb 'Mol an oige agus tiocfaidh sí' ('praise youth and she will thrive') is an important reminder of the role to be played. The goal of this Action Statement is therefore to provide an evidence-based reference point, based on core principles, to guide the practice of coaches and key stakeholders who support the athletic development of players at every stage of the player pathway.

LTAD for Gaelic games

KEY GOALS

The term athleticism refers to the ability to repeatedly perform a range of movements with precision and confidence in a variety of environments. This requires competent levels of motor skills, strength, power, speed, agility, balance, coordination, and endurance and is a key construct underpinning the process of long-term athletic development.⁴²

The Gaelic games LTAD approach has two main goals:

- First, to support all players to be able to participate in and enjoy Gaelic games for as long as possible.
- Secondly, to guide the development of players for inter-county competitions at adult level.

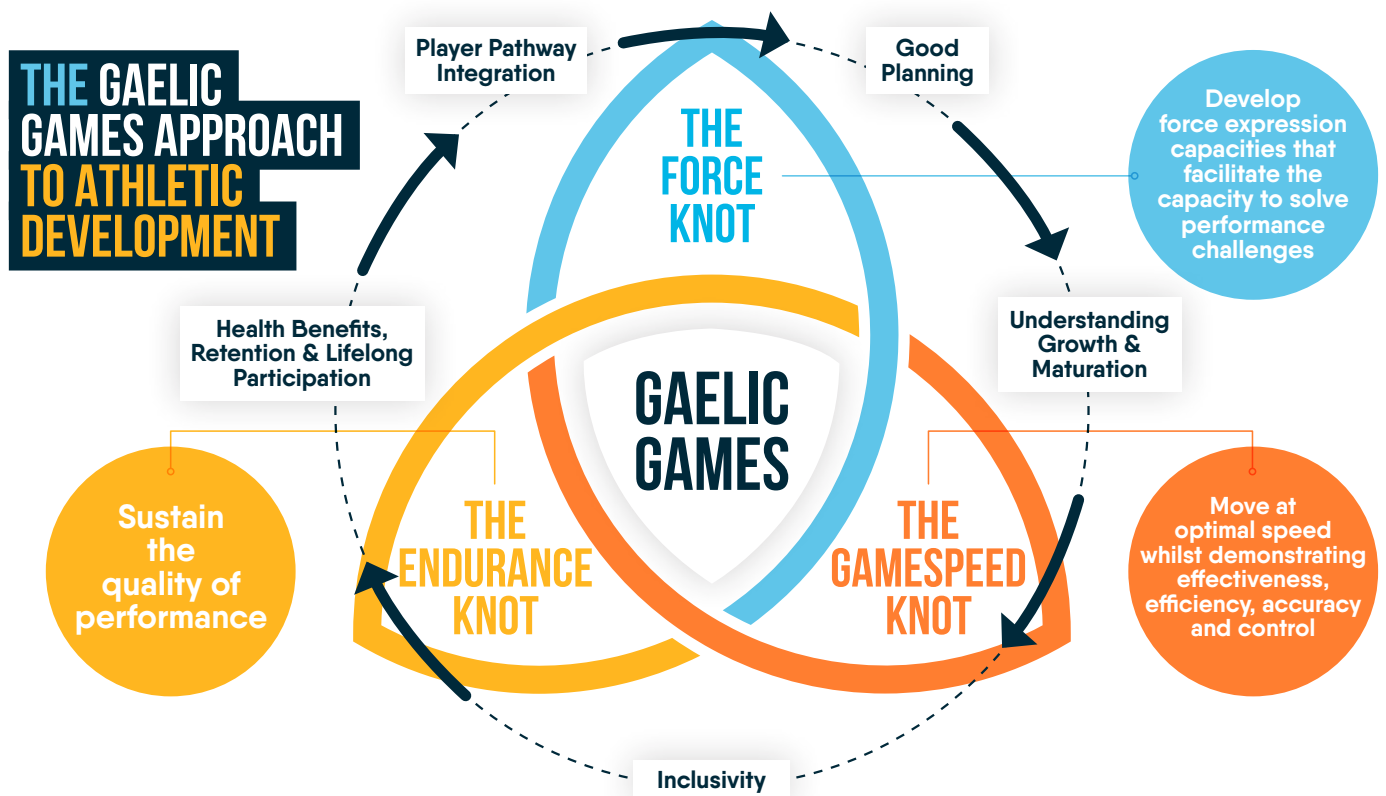


Figure 2. The Gaelic games approach to athletic development

Higher levels of physical fitness and athleticism should translate to better performance on the pitch, enabling players to cover greater distances, at greater intensities and with greater quality; these capacities will also facilitate enjoyment of the sport and hopefully encourage long-term participation.⁵¹

Although it is impossible to eliminate injuries altogether, building more physically resilient and robust players should better prepare those players for the demands of the sport and reduce the chances of sustaining injuries – especially those induced by overuse.¹³ This is specifically relevant for Gaelic games sports, given their typically high-intensity, intermittent, collision-based nature.^{50,57} Previous research in Gaelic games has shown that simply implementing a targeted entry level warm-up can improve dynamic balance and reduce injury risk in both adolescent³⁶ and young adult players⁵⁹ alike.

Investing in a long-term development process to improve the breadth and depth of athletic qualities in young players is generally believed to result in better outcomes than attempting to acquire short-term ‘quick wins’;²⁰ this long-term approach underpins the pathways outlined in this Action Statement. The ideal scenario should

see Gaelic games players enter a Gaelic games athletic development programme at a young age and undertake a progressive age- and stage-appropriate programme of development that complements and expedites the entire spectrum of performance indicators – including athleticism, sports-specific technical skills, tactical proficiency, decision-making skills and psychological skills.²⁸ It is important to emphasise that this is not a self-limiting approach: within the player pathway outlined, players are able to start the LTAD process at a range of entry points, so that no-one is excluded from the pathway.

Those involved with the development of young Gaelic games players must understand that LTAD does not involve simply superimposing adult-based training on young players. It is important to understand that youth populations are not ‘miniature adults’: children and adolescents have unique physical, psychological, and social needs that fluctuate during their developing years, needs which must be considered when designing appropriate training programmes. Existing literature has shown how athletic development and concepts of growth and maturation can be considered together;⁴⁰ importantly, it demonstrates how these ‘big picture’ principles can then

be translated into the design of everyday youth-friendly training sessions. Biological maturation has been shown to influence developmental opportunities and success at a young age,¹ something which has been demonstrated recently via research within a Gaelic games context.²¹ There is a maturity bias and a parallel lack of understanding regarding the holistic nature of athlete development,²¹ which we urgently need to address in Gaelic games.

A PRACTICAL FRAMEWORK

Effective implementation of LTAD requires workable solutions; ultimately the application of any LTAD programme will depend upon how well it can be integrated into local structures and systems. However, although variation is needed in the application of LTAD, there does need to be an overarching framework around which to build an effective programme. Consequently, it is contingent upon the GAA, LGFA and the Camogie Association to jointly provide an indicative preferred approach and framework for athletic development.

This approach and framework is built upon best experiential practices underpinned by high quality up to date research, while also being sufficiently flexible to facilitate adoption.⁴ The approach is to develop a system that addresses all of the components of physical fitness and athleticism that underpin performance in Gaelic games and to develop these through integrated and sequential structures of development that comprise effective practice based upon the most up-to-date recommendations. These will be recommendations gained from a range of disciplines including – but not limited to – principles of training theory, motor control, growth, maturation and psychology.

The framework presented and how it integrates into the overall Gaelic games landscape was agreed in a series of round table discussions between world leading experts in LTAD. The adopted approach is shown in Figure 2 and is based on the ‘Trinity knot’, which itself has a focal centre point and three leaves.

These leaves individually signify the broad components of physical fitness as they relate to Gaelic games. An important factor to note at this stage is that the knot structure indicates integration. Consequently, the components of physical fitness – although they have individual characteristics and requirements – will have aspects that are common to all three elements, for example the ability to:

1. Move well and effectively
2. Generate and absorb force
3. Enhance work capacity.

Ultimately, these components come together in the performance of a central goal – ie, the ability to play the game. Renowned LTAD practitioners put it well when they said players must:

‘be physically competent to do the technical stuff, and technically competent to do the tactical stuff’²⁴

The importance of this central section is twofold; first, ‘club is core’¹² and the goal is for people to be able to enjoy lifelong involvement in Gaelic games. Secondly, all components have to relate to how they enhance performance in the Gaelic games. Consequently, all decisions made by coaches implementing and supporting the player pathway should be based around these dual goals of participation and performance, with the success of the programme similarly judged by success in both realms. Although the processes inside the knot focus on the functional goals of athletic development, the processes surrounding the knot are integral to the achievement of these goals. These can be considered as the guiding principles and knowledge upon which athletic development is based and stress the dual aspirational nature of the framework.

One key process of developing an effective overarching structure is the use of easily understandable and consistent language. Consequently, the use of consistent terms for the people delivering the pathway and what they do is crucial. The field of physical

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training is littered with titles that attempt to delineate what such coaches do, such as strength and conditioning coaches, fitness trainers, and so on. Unfortunately, such terms often come with preconceptions that can directly influence perceptions of the roles and can unwittingly guide actions that may not be conducive to LTAD. The ‘strength and conditioning’ coach role, for example, emerged initially as an extension of the role of the American Football ‘strength coach’,³³ where the strength development aspect of athletic development dominated. As a result, this term can lead to a potential misunderstanding by stakeholders, particularly parents and guardians, around the nature of athletic development for young players; this can often result in a lack of appreciation of the potential benefits of a balanced athletic development programme on performance. To address this, it is recommended that all individuals involved in delivering the pathway are given the title ‘Athletic Development Coaches’ and they should be qualified at least to an agreed minimum level.⁵⁸ This title focuses on the task of developing athleticism across all three leaves of the knot, with the goal of developing a more prepared player able to experience their physical literacy and performance journey through a lifetime involvement in the sport. To tie in with this, sessions or components of sessions where the competencies and capacities associated with the knot are developed should be titled ‘athletic development sessions’. This new ‘athletic development’ language emphasises the development aspect of the pathway and how the focus should always be on the progressive advancement of athleticism across all leaves of the knot, with a long-term perspective rather than a short-term one.

The three leaves

Athleticism and physical fitness for most team sports, including the Gaelic Games, can generally be thought of as lying in three broad domains – the force domain, the movement domain and the endurance

domain.³³ These three domains can be translated into the ability to:

- 1) move well
- 2) apply (and absorb) force and
- 3) sustain the quality of performance.

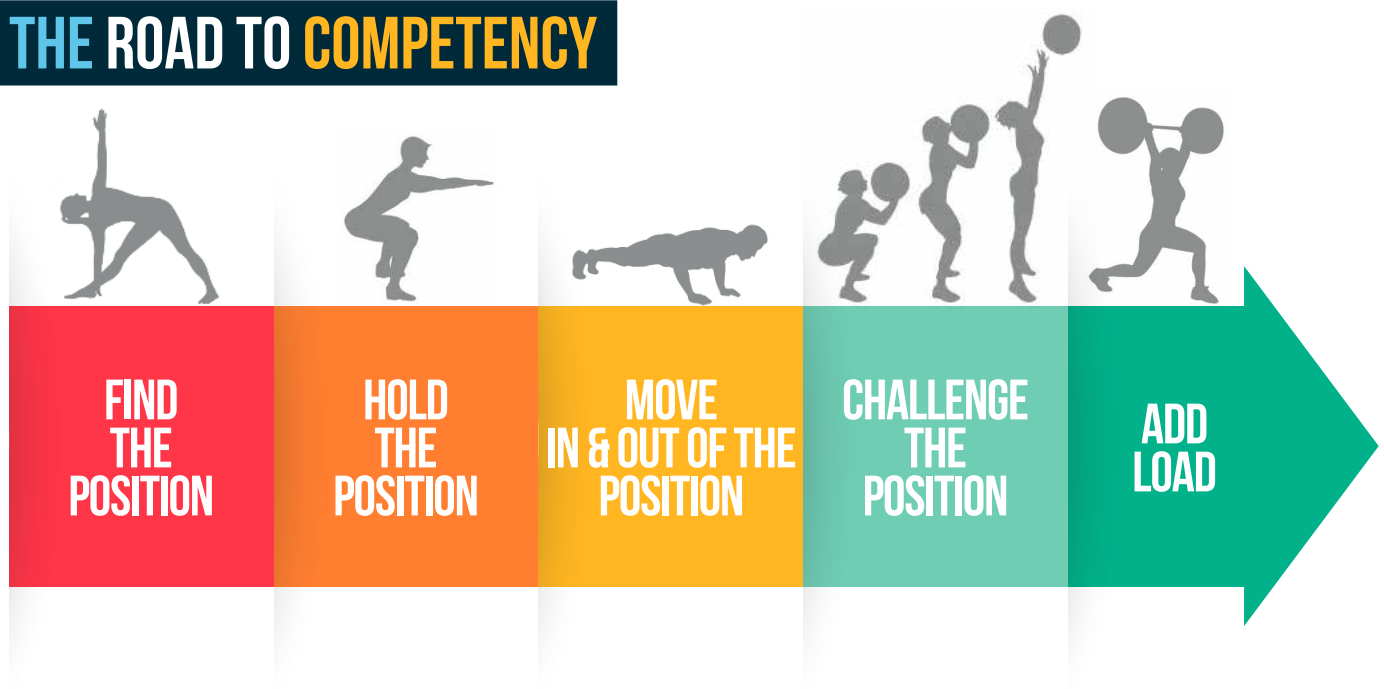
Consequently, the three leaves of the knot are built around these three components. However, although the components are listed separately, they are ultimately interlinked: for example the ability to apply force and move well is built around functional competency; the ability to move requires the application of force; and the ability to sustain performance is based upon the ability to move well. Using the three leaves approach allows a development pathway to be built around each leaf, while also ensuring that integration occurs in relation to the requirements of the game.

1. CORE FUNCTIONAL COMPETENCE

As outlined previously, although each leaf is associated with a broad aspect of physical fitness and performance, all are ultimately integrated. As a result, all three leaves are underpinned by the concept of functional competence. Developing a broad range of athletic skills and competences lies at the heart of the development pathway. Ericsson¹⁸ points out that skills are ultimately scaffolded, with higher skills built upon basic competencies: the more effectively these competencies are ingrained, the higher the potential for ultimate skill development. This concept underpins the development pathway, where time needs to be devoted to developing and honing these competencies and therefore this stage cannot be overlooked or rushed.⁴² Unfortunately, it is often overlooked in situations where short-term performance is stressed over long-term development.⁴²

Consequently, ensuring that functional competence is emphasised – and with appropriate time devoted to developing this competency – is the starting point for all programme designs, regardless of the age group involved. Functional competence itself can be considered as

THE ROAD TO COMPETENCY



an assessment of movement quality and requires an integration of a range of factors including balance, mobility, postural control, co-ordination, and perception.⁹ Superior movement quality is a cornerstone of safe and effective long-term athletic development, contributing to both the quality of performance and participation in youth players,^{4,15,42} while potentially reducing injury risk.^{25,54}

Importantly, the Gaelic games player pathway recommended is flexible and can be initiated at a range of ages.^{11,12} Ideally, the player would enter the pathway at a young age, allowing for a longer development pathway, but this may not always be possible. Adopting an approach where functional competency is always at the start of any programme will allow players to enter the pathway at an older age and still benefit from the sequential development structures fundamental to long term athletic development.^{27,28}

Once the player's functional competence and technique has reached an appropriate and acceptable level, then, and only then, should the player progress into more advanced training strategies (eg, strength and power training). This approach has two key advantages:

1. It ensures that coaches can have the confidence that their players can cope with the increased challenge
2. It also ensures that players have the functional competence to be able to

optimally benefit from the progressive challenges, physically, technically and tactically, at the later stages of the development plan.

Within the framework, there are a range of exercises, competencies and movement screens that can be used to assess whether the player is deemed to have reached an acceptable level from which to progress. Qualified practitioners and coaches are encouraged to select the most appropriate methods of assessing progress – ones that are both valid and reliable, but also able to be effectively and efficiently used within the context they work in.

2A. THE FORCE 'LEAF'

Previous position papers have outlined that a well-constructed resistance training programme is safe and beneficial for youth players.^{4,15,42} Therefore, the decision to include/exclude resistance training programmes from the development pathway should be related to the two-pronged goals of benefits to performance and/or health. In relation to performance, Gaelic games are characterised by movement – movement of players and movement of the ball, and the ability to initiate and change movement is crucial for effective play. The ability to change movement is dependent upon the ability to apply force, or perhaps more specifically the ability to apply impulse;⁸ consequently, where impulse can be increased, it brings opportunities to enhance performance. Given that resistance training interventions can increase impulse, they should be a key part of any athletic

Figure 3. The road to competency

THE FORCE KNOT CONTINUUM

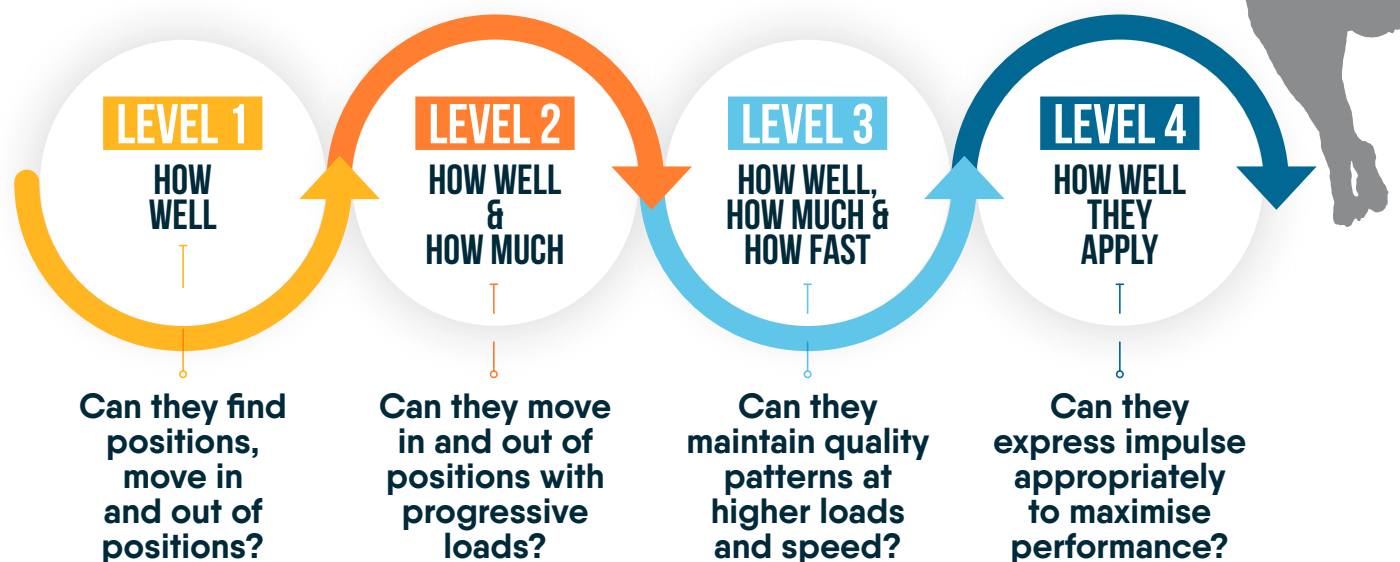


Figure 4. The Force (strength and power) development continuum

development programme, with the key goal of increasing the amount of impulse that can be applied during specific movements.

As well as performance benefits, there is an increasing realisation that effective resistance training programmes are also an important aspect of effective health-based interventions as suggested by the World Health Organisation's physical development recommendations for children, youth and adults, bringing benefits such as enhanced bone health, enhanced body composition, and so on.⁶ Therefore, resistance training programmes should be included in the LTAD pathway on a health rationale as well as a purely performance one.

Ultimately, safe and effective resistance training programmes are built on appropriate progression.^{19,41} As highlighted earlier, the force leaf as with all of the others needs to be underpinned by functional competence to ensure safe and effective progression. The key to the successful implementation of a programme is that it is technique- and competence-driven, and not driven by chronological age; within this approach, players should 'earn the right' to progress along the continuum through demonstration of competence at any given point.²⁴ Players need to develop the capacities to find effective positions, to develop the ability to hold these positions, to develop the patterns that enable them to

get into effective positions and to do these consistently, before being exposed to any additional loads over and above bodyweight. This competency approach is summarised in Figure 3.

Throughout the pathway, the role of effective coaching is crucial, ensuring that a range of quality movements are introduced and that errors are addressed using appropriate tactics such as the use of corrective exercises and the regression of challenge where appropriate. Once basic movement competency is achieved, movements should be developed via appropriate progressions, instigated upon the attainment of competency and with the whole pathway based on competency and not on chronological age. Appropriately qualified and skilled coaches are crucial to the process and therefore this action statement will be supplemented by the development of an education programme aimed at ensuring coaches are appropriately skilled to deliver the pathway. Once competency is achieved, appropriate progression should be applied, initially focusing on appropriately increasing loads, and subsequently on progressing both load and the velocity of force application. However, at all times the emphasis should be that technique and movement quality is paramount and any regression in quality should be an indication that progression is happening too quickly.

The overall progression sequence for the force leaf can be summarised as:

- **FOCUS 1: How well:** can they find the required position, can they hold the required position, can they move into and out of the position appropriately?
- **FOCUS 2: How well and how much:** can they maintain the above patterns but with small but progressive increments of additional loads?
- **FOCUS 3: How well, how much and how fast:** can they maintain the quality of movements at higher loads and at progressively higher speeds (for explosive movement patterns)?
- **FOCUS 4: High performance:** can they express impulse in the required movements at the levels required for high performance?

Importantly, the focuses listed here are simply indicative of overall progression. In terms of application, it is better to consider the whole process as a continuum (see Figure 4), with players progressively moving along the continuum at a pace commensurate with their competency. What the levels do indicate is the emphasis stressed as the player moves through the continuum. The goal of this continuum

approach is to prevent any sudden spike in workload, load or velocity that could potentially derail development.

2B. GAMESPEED 'LEAF'

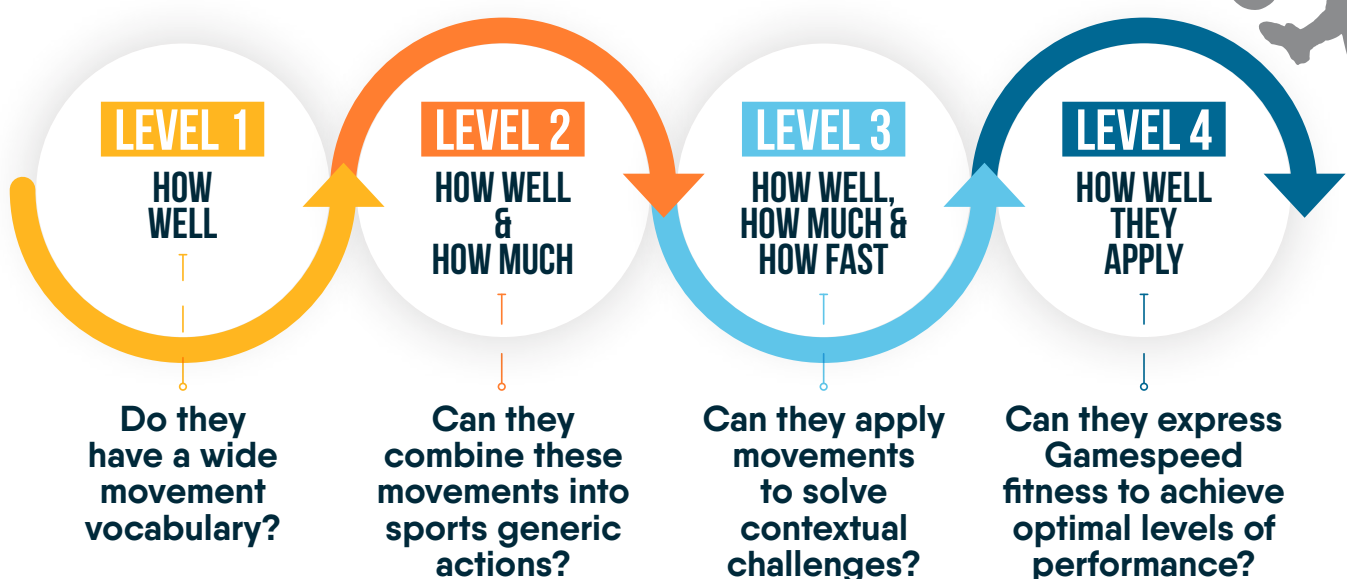
As highlighted earlier, effective locomotor movement is crucial to effective performance in the Gaelic games.¹⁵ Consequently, the skills typically associated with speed and agility play a crucial role in high performance and as a result need to be a targeted area of development.

However, there is a key difference with this leaf in that, although strength development has general health benefits and underpins a range of wider competencies, speed and agility has fewer specific health applications and their impact on performance is more specific to the context of the game. It is also important to note that effective locomotor movement is facilitated by the competencies associated with the force leaf, but that this alone is insufficient to develop the competencies required for the Gamespeed leaf. Here the skills related to locomotion and to the specific movement requirements of the sports are paramount.

Unfortunately, the scope of the term movement has been too often restricted to those associated with the force leaf (eg, 'squat', 'lunge' etc) and too often movement

Figure 5. The Gamespeed development continuum

THE GAMESPEED KNOT CONTINUUM



competencies associated with this leaf are omitted from discussions of effective movement.^{30,34} However, effective locomotor movement is crucial to performance and must play a key role in the development of athleticism. The pathway itself is based around a progression to game-based movement competency, and therefore the concept of Gamespeed underpins the pathway.

As with the force leaf, specific functional competency underpins the whole structure. As a result, it is important that the spectrum of movement competencies associated with Gamespeed are developed in the initial phases of the pathway continuum. Here the Gamespeed syllabus, based around the target classification system³⁴ is critical. This outlines the key initiation, actualisation and transition movements that underpin performance, and these then become the focus of development. Once a player masters an appropriate level of movement competency in these movement patterns, additional challenge and complexity can be added to the movements via the addition of added degrees of freedom to exercises.^{30,34} This allows a progression from single movements to movement combinations, from general movements to sports generic applications, from closed movements to open movements all ultimately leading to sport specific movement capacity. The overarching goal is to develop a level of Gamespeed fitness that allows players to effectively deal with the movement challenges they face in a game. Utilising a competency-based approach – arming the player with a wide vocabulary of movements and then progressively developing and challenging these through the development sequence (as outlined in Figure 5) maximises the application of high levels of Gamespeed. Again, the pathway utilises a continuum, with focus at each phase involving:

- **FOCUS 1:** How well the players move across a range of locomotor movements
- **FOCUS 2:** How well they can combine key movements into sports generic capacities
- **FOCUS 3:** How well they can apply these movements in sports-generic and specific situations, combining perceptual, cognitive motor control and physical constraints
- **FOCUS 4:** High performance, where they apply the entire gamut of Gamespeed fitness to game performance.

2C. ENDURANCE 'LEAF'

The final leaf of the framework concerns the ability to sustain the quality of performance across the duration of a game, as well as the ability to repeat performances throughout a season. Once more, the integrated nature of the three leaves is clear. The ability to sustain a high quality of performance is dependent on the ability to achieve high performance in the first place. As a result, the ability to maintain high levels of impulse depends on how much impulse can be generated in the first place; similarly the ability to sustain high levels of speed depends on the initial speed capacities of the player.

Consequently, the work carried out in the force leaf and the Gamespeed leaf are integral to high performance in the endurance leaf. However, performance sustainability is also dependent on the development of appropriate metabolic fitness that requires the development of the metabolic pathways involved in the game. The most time-efficient way to achieve this is through integrated conditioning, and this is the preferred approach of the athletic development pathway.

Integrated conditioning means getting fit through the game and/or game like activities. Where possible, the player's metabolic conditioning should be completed using activities closely related to the game. There is evidence to suggest specific Gaelic games drills, such as purpose-built small-sided games can provide excellent results for players.⁵⁰ Anecdotally, within Gaelic games and from our own experience, motivation and compliance is also higher when put into the game context. However, this approach is not without challenges. Initially performing games to an intensity and/or volume required for physiological adaptation requires a baseline work capacity.^{51,52} Players without this capacity may struggle to achieve the work intensities during the game activities required for adaptation. Consequently, there may be a need to develop a baseline in work capacity before utilising game activities.⁵⁰ Similarly, for certain aspects of metabolic capacity, such as anaerobic glycolytic development, the game-based activities may not produce the work patterns necessary to provide the necessary physiological overload, such as sustained high intensity movement, and so at stages of development where higher levels of specific physical fitness are required, additional activities may be necessary that provide the specific conditions required for anaerobic adaptation.

'Individual differences in growth and maturity should also be considered in the design, implementation, and evaluation of training and athletic development programmes'

THE ENDURANCE KNOT CONTINUUM



The development pathway for the metabolic leaf can be summarised as:

- **FOCUS 1:** How well the players move and developing baseline work capacity
- **FOCUS 2:** Using a mixed approach to develop a high level of general metabolic/work capacity
- **FOCUS 3:** Using an integrated approach to develop a high level of specific metabolic capacity with the addition of specific adaptation activities where necessary
- **FOCUS 4:** High performance, using a targeted approach to developing the specific metabolic capacities required of high-level performance.

Delivering an athletic development plan

The overarching development structures for each of the individual leaves of the Gaelic games knot should guide the specific practice in each of the performance domains. However, and crucially, if they are to have any substantial impact, they need to be combined into a coherent programme that blends seamlessly with the overall player pathway. This will include the sports-specific technical and tactical development

that forms the heart of any effective development programme. Consequently, the development of athleticism should always be considered as an adjunct to this; building the programme around the structures in place for the sport-specific work will facilitate the optimal adaptation and deployment of the athletic development programme.²⁸ Effective athletic development programmes and pathways require effective planning over the short, medium and long-term. This provides an inherent challenge as current structures of competition and training are typically built over short-term timeframes – usually a single season. However, as has been outlined previously, athletic development is sequential, with higher capacities dependent upon the establishment of sound fundamental capacities in each of the leaves of the knots. Consequently, effective athletic development needs to be built over longer time frames, requiring multiple years and even whole career considerations.

Early childhood (prepubescence) is a critical time for the development of fundamental movement skills (FMS), which are considered the building blocks of more complex movements.^{3,43} The development of fundamental movement skills (FMS) in a safe and fun environment is critical to ensuring that appropriate competency of movement patterns is achieved and should

Figure 6. The endurance development continuum

‘Prior to the adolescent growth spurt, training should focus primarily upon the teaching of fundamental and sports-specific skills and cover the functional competency components of all three leaves’

be the primary objective, using physical development programmes for children from early to mid-childhood;^{40,42,56} as such they would be entirely appropriate for Gaelic games settings. This approach also has the benefit of potentially enhancing overall physical health.⁵ Several approaches can be utilised to develop FMS: for example, small-sided, cooperative and fun games can be incorporated within Gaelic games training to help develop FMS, which can also benefit and allow for the concurrent development of various components of physical fitness. However, it must be remembered that games can be an unequal form of training and although they may facilitate appropriate development in some players, they can never be assumed to foster the same development in all.³⁹ Accordingly, games should be supplemented with activities and tasks that facilitate the development of the building blocks of movement competency.

Individual differences in growth and maturity should also be considered in the design, implementation, and evaluation of training and athletic development programmes. In this way, training content and stimuli should be selected to match the maturational status of the player and their competence in the activities selected. Prior to the adolescent growth spurt, training should focus primarily upon the teaching of fundamental and sports-specific skills and cover the functional competency components of all three leaves.⁴² Adaptation to training in childhood is largely neuromuscular and so focus should be placed on activities that improve technique, co-ordination and neural activation.

As children enter puberty, the potential for adolescent awkwardness and an increased risk of growth-related injuries (eg, Sever's disease, Osgood Schlatter's, Sinding-Larson syndrome, spondylosis, stress fractures) emerges, and coaches should be aware of the potential impact this can have in many domains.⁵³ Coaches, parents, sport scientists and medical practitioners should be made aware of players who are approaching and entering the growth spurt and should be encouraged to carefully monitor and report any changes in performance, symptomology and fatigue in these players that may necessitate a change in training load and content.⁶⁰ To help players transition through the adolescent growth spurt more effectively and without injury, coaches should emphasise activities that promote core strength, balance, coordination and maintain mobility, while also emphasising the retention of fundamental and sports-

specific movements skills. This may also necessitate a reduction in training load and in activities that involve rapid accelerations and decelerations.⁶¹ Adolescent girls are particularly at risk for lower limb injuries during the growth spurt due to comparatively greater increases in overall size in relation to lean mass.⁵³ To mitigate this risk, athletic development coaches should introduce activities such as neuromuscular training (eg, FIFA 11+) that can help build lower body strength and quality of movement during this period.

With respect to competition, children should be encouraged to engage with other sports and/or other training activities and modalities until at least late puberty⁴⁴ and by developing a range of FMS through multiple sports, children are given the best possible chance to participate in a range of health-enhancing physical activities successfully and persistently across the life span.² Gaelic games players who are especially mature or delayed in maturity for their age should have the opportunity to compete up or down an age group, if considered beneficial for their development. Considerations to have a player compete up or down an age group must provide an accompanying rationale, together with appropriate empirical evidence, and be approved in advance of competition.^{10,16}

Coaches are also encouraged to consider the player's technical and tactical aptitude, and psychological and social maturity when making such requests. Applications should be judged independently, based on the benefits to the player's development and welfare. Teams that are permitted to play a player up or down an age group should communicate this to appropriate officials and opposing teams in advance of competition, as well as ensuring players, parents, officials and coaches are aware of how to manage such dispensations effectively.⁷ Clubs are also encouraged to consider maturity-matched (ie, bio-banding) training and game formats to present new challenges to early and late maturing players and diversify the learning experiences.⁴⁷ Bio-banded games and Futures teams (ie, squads for late developing youth) also allow coaches to evaluate players in different competitive environments and can operate alongside age group games to provide a varied games programme.

An awareness of the importance of informal play is also encouraged. It is important for all stakeholders to facilitate opportunities and environments for young people to

play informally. One of the actions also recommended by the expert group is to develop education in the area of multi-sport and sport specialisation outside and within Gaelic games. This will help guide decision-making in the Gaelic games community.

Although the development pathway provides for an evidence-informed plan that addresses the progressive journey towards high performance, it is important to again stress that this process will not be linear. Individuals will likely experience times of rapid improvement, times of low improvement and even times of performance regression. This is to be expected, as this athletic journey will be accompanied by the journey of life, a journey that will see different phases of growth and maturation, times of joy and times of stress – all of which will affect the development process.

EMBEDDING ATHLETIC DEVELOPMENT IN PRACTICE

Athletic development sessions will lie at the heart of the athletic development programme. Ideally, two to three inputs per week should be protected for LTAD. Understandably, this may not be possible in all situations and so a pragmatic approach is recommended, where even a single session per week is better than no session at all. This work needs to be integrated into a player's overall training load where, ideally, no player should exceed five sessions per week on one specific sport.^{17,44} Typically, two basic structural approaches exist to deliver LTAD – integrated approaches and discrete approaches.

Integrated approach

In the integrated approach, the athletic development session will be totally integrated into the sport-specific session. So, for example, mobility, movement development and speed work could be included in the warm-up of the session, agility work could be integrated into skill tasks, especially those involving offensive and defensive tasks.^{29,30} Additionally, metabolic development could be achieved through the manipulation of game-based activities, which could also be structured to further enhance Gamespeed capacities. A major advantage of this approach is the control of overall workload, as activities can be chosen where a single input such as a conditioning game can have several potential benefits, such as developing metabolic conditioning, agility capacity, decision-making skills, tactical appreciation and so on.

However, it is important to note that the integrated approach is not a panacea and has potential disadvantages, especially in relation to implementation.^{27,31,32} First, it requires sophisticated planning: planning that must involve the athletic development coach working alongside the sport-specific coaches. Secondly, activities chosen may ultimately be compromises, and as a result may be sub-optimal for either the athletic development or sport-specific goals. Thirdly, and importantly, not all components of athletic development can be optimally developed through integrated activities. Many of the capacities of the force leaf for example simply cannot be achieved through integrated approaches.³³

Discrete approach

Discrete athletic development sessions, unlike integrated sessions, involve specific time being devoted solely to athletic development. These sessions should focus on developing all three leaves of the knot, although the emphasis can be varied across different sessions. If these types of sessions are preferred, it is likely that several inputs will need to be utilised to ensure all three leaves of development are addressed. Importantly, there will never be an optimal structure for a discrete session and consequently, these should be planned in relation to what fits best in the individual context. For example, some clubs may prefer to have short 30 to 40-minute sessions before or after team training, whilst others may prefer a longer dedicated session not linked with team training. Where single session approaches are preferred, all the necessary inputs would need to be included within that session whereas if multiple sessions are preferred, the inputs can be distributed across sessions. Clearly, the optimal solution will be dependent on the logistical challenges of the individual club, school or county, and each has potential advantages and disadvantages.

Perhaps the optimal approach will ultimately be a combined approach that exploits some of the advantages of both approaches, while aiming to eliminate some of the disadvantages. Here some athletic development activities will be integrated into sport specific sessions, whereas others will be delivered via discrete sessions. For example, the use of a RAMP warm-up may be utilised to deliver Gamespeed and mobility development at the start of a team-based session; conditioning games could also be utilised to deliver a metabolic stimulus, while a dedicated discrete strength and power session could be conducted before

'Gaelic games coaches should ideally possess a basic understanding of growth and maturation and how these processes impact athletic development and health in youth'

or after the team-based session to ensure adequate development of that specific leaf.^{29,33}

DELIVERY MECHANISMS

Perhaps the greatest challenge to the implementation of any athletic development programme is that of finding the right people willing and able to deliver. This challenge requires two confounding factors to be addressed: the first is simply finding sufficient people willing to deliver the programme; the second ensuring that those delivering have the required practical skills and baseline knowledge to deliver the programme effectively. Appropriate education is clearly critical, but this needs to be balanced: too great a requirement to undertake educational activities could potentially reduce the potential pool of willing participants. Consequently, the optimal approach to education may be to initially provide the right amount of information to be able the individual to deliver effectively, no more no less, but providing further upskilling opportunities should they wish to avail themselves of these. Importantly, mandating a uniform approach would be folly and instead solutions that are locally optimal are recommended.

SPECIFIC CONSIDERATIONS

The above provides a framework around which athletic development programmes can be based. This flexible approach allows for contextually relevant approaches to be utilised, which will hopefully translate into the wider adoption and application of LTAD programmes. However, and importantly, whichever approach is utilised, it needs to take into consideration two key factors which should guide practice, namely: the effects of growth and maturation on decision-making and the importance of workload management.

Growth and maturation

As highlighted earlier, athletic development is rarely, if ever, a linear journey. The range of factors that will affect the journey are diverse and variable, and underpinning this journey is the process of growth and maturation – which in itself has the capacity to directly influence the development process. Although the tempo and timing of maturation is primarily a result of genetic inheritance and something that the child or coach has no control over,⁴⁵ a base knowledge of growth and maturation allows coaches to accommodate these processes and, in doing so, optimise the challenges and opportunities for all players. Consequently, the growth and maturation

process should inform decision-making at any point in the journey and registered Gaelic games coaches should ideally possess a basic understanding of growth and maturation and how these processes impact athletic development and health in youth. To facilitate this, the Gaelic games organisations are currently planning a number of courses to facilitate coaches in understanding the concepts of LTAD and helping them deploy these programmes into their club, county or association.

From puberty onwards, sports prioritising size, speed, power, and strength, across all Gaelic games codes, have an inbuilt tendency to select for boys who mature in advance of their peers.⁴⁶ These maturity biases in boys generally increase with age and tend to be greater on more select teams.⁵⁵ Such is the variation in growth and maturity that two boys of the same age can vary by as much as 5-6 years in their biological ages,³⁵ providing great challenges to ensuring equity of opportunity in training and in competition. This bias can lead to the situation where equally talented, yet late maturing boys are less able to compete physically and, as a result, are more likely to be excluded or overlooked.³⁵ The situation with girls is slightly different and although girls who mature early may possess an initial advantage in late childhood and early adolescence, evidence suggests that the bias shifts towards later maturing girls in late adolescence.⁴⁸ Given the potential impact on selection and subsequent opportunity, Gaelic games coaches need to be aware of potential maturity selection biases and ensure that players are judged and given opportunity based on their technical, tactical and psychological merit and not just physical aptitude alone. Importantly, the exclusion of late maturing boys and early maturing girls from sport may also have important implications for health and long-term participation in sport.⁴⁶

Gaelic games coaches also need to recognise the potential for relative age effects (RAEs) to affect selection processes.⁵⁵ RAE is a related, yet distinct, phenomenon whereby children born at the start of the school year are disproportionately represented in competitive sports programmes. RAEs have been shown to be present from early childhood and to be relatively stable through adolescence.^{37,38} They are also observed in many non-physical domains, such as education, suggesting that these effects are more likely to arise from age-related differences in experience, together with cognitive, motor and social development.

Coaches and parents should be aware of individual differences in relative age and the extent to which they may bias player selection in their youth sports programmes. Strategies to counter the relative age effect should be considered from early childhood with the aim of giving all children, regardless of their birthdate, the opportunity to participate and succeed in sport.

To ensure that growth and maturation is taken into consideration when making training and selection decisions, it is recommended that the growth and maturation status of Gaelic games players should be assessed and monitored on a regular basis.^{46,55} This should be carried out in a considered manner and players and their parents should be made aware and reassured that all measurements are taken for the purpose of optimising athletic development and ensuring safety and health, and not for the purpose of evaluation.^{16,26}

To optimise the process, Gaelic games registered players in their clubs, schools or countries, and their parents should provide information pertaining to the player's date of birth and, if available, self-reported or measured biological parent height. Players should have their heights and weight measured at the start of the season and ideally every four to six months thereafter, following standard field practices in the presence of at least two adults. Measurements should be recorded to the nearest 0.1 cm. and 0.1 Kg. and recorded and stored in compliance with

recommended guidelines. Combined with demographic data (age, mid-parent height), these measures can be used to determine:

- 1) The rate at which the child is growing
- 2) The current maturational status (pre-pubertal, pubertal, post-pubertal) and timing (early, on-time, delayed)
- 3) The biological age
- 4) Whether or not the child is entering a phase of development (ie, growth spurt) where the child is at greater risk for injury
- 5) The future adult height.¹⁰

Optimising and managing workload

The ability to monitor a player's development and plan the player's content accordingly is crucial to effective player development. This can help ensure that players are positively adapting and not entering a state of over or under training. Every session should ideally be monitored for workload, where the players' readiness to train is also considered. Workload can be divided into two sub-categories: external load and internal load. External load is the actual quantity of physical work being undertaken, and this can be considered in terms of factors such as the distance run in training or a game, the volume load lifted in a resistance training session etc. Internal load on the other hand, is the internal response of the player to the external load.

Figure 7. Session RPE scale



THE PRINCIPLES OF PLANNING

- 1 Be aware of the players total workload, not just what they do with yourself. This could include what the player is doing with the club/school/county and any other sports/activities and organisations they may be involved with
- 2 Provide guidance and Support to players who are over trained and under trained
- 3 Be aware of spikes in the players workloads. This can increase the risk of injury
- 4 Taper the players workload in the lead into important games as this may help optimise performance
- 5 Avoid*:
 - Completing two high intensity activities in the one day
 - Playing two full games within 60 hours
 - Completing high intensity activities on two consecutive days
- 6 Encourage windows and opportunities for unstructured free play activities during the players week
- 7 Help players to understand the principles of planning and encourage them to communicate with the coach
- 8 Encourage involvement in a variety of activities/sports. As the player gets older, the number of activities will decrease. Coach to contact the managers of the other activities to plan smartly and follow the principles of planning.

Figure 8. Principles for monitoring and applying workload

Load can be measured in several ways such as using heart rate, the session RPE method etc. Differentiating between external and internal load is important, as the same external load can have different internal loads depending upon multiple individual variables such as training experience, stress capacity, health status etc.

Given that the goal is to allow the athletic development pathway to be deployed as widely as possible, it is important that measures taken are cost effective and easily utilised whatever the budget. Using RPE as an indicator of internal load is a cost-effective strategy. The session RPE is a subjective rating of effort, usually reported following the session or game and recorded by the player. It is calculated from a scale of 1 to 10 with 10 being a very, very hard effort (see Figure 7). The reported session RPE is then multiplied by the session duration (in minutes). This provides an arbitrary unit 'total' of the session workload. However, although useful, this is not without its drawbacks, one of which being the peak/end issue where an individual's RPE scores are unduly influenced by the most intense aspect of the session undertaken, or the last activities in the session. However, notwithstanding these drawbacks, using the session RPE can give a general indicator of the internal load of a given session and enable this to be monitored acutely and over time. The potential positive effects can be enhanced by encouraging transparent and honest reporting, through effective education and appropriate use of the data gleaned. A distinct advantage of regularly

monitoring workload is that it allows a long-term picture to develop of a player's responses to differing training systems and protocols. This allows for the identification of trends across multiple timescales.

Beware of spikes in workload

Spikes in workload may be defined as periods where a training load dramatically increases from one week to another, a situation where injury risk might increase. Although not always controllable, what can be generally determined is that spikes in workload appear troublesome.⁴⁹

Evidence does suggest that – apart from exceptional circumstances – if a training load increase is required this should not exceed 10% on a week-to-week basis. However, it is important to emphasise here that training workloads generally need to increase over time if consistent gains are to be made over the player's development pathway. General principles for monitoring and applying workload are outlined in Figure 8.

Athletic profiling | physical fitness testing

The ability to monitor, evaluate and adapt athletic development programmes is crucial to their ultimate success. As a result, generating appropriate information around which to base these analyses will be a cornerstone of an effective programme. Again, there will necessarily be differences in the approaches taken by organisations in relation to athletic profiling and performance testing, all very much based on the human expertise and physical resources available at any specific location.

However, in general the approach should mirror that of the training journey.

Consequently, the initial phases of profiling should focus on the quality of performance rather than the quantity. Here, qualitative analysis through approaches such as screening should form the greater part of the initial profiling. To facilitate this, tools such as the Functional Movement Screen can be effectively deployed (including abridged versions of these where constraints preclude using the full version). This screening can be supplemented by qualitative analysis of other key athletic skills such as jumping, landing, sprinting and other key locomotor patterns. As the athletic journey continues, focus can shift towards more quantitative approaches, focusing on key indicators of athletic performance such as jump height, sprint speed, general endurance capacity, etc. However, there is an important caveat here: analysis of functional movement proficiency

together with locomotor and balance proficiency has shown these capacities to plateau at a young age,³ and to fluctuate through different stages of an athlete's development, suggesting that these capacities need to be a focus of training throughout an athlete's journey. Consequently, maintaining a focus on screening activities will remain important, even where greater quantitative analysis is being carried out.

Again, this brings important considerations about how best to deliver an effective profiling and testing programme. These considerations should focus around not only how best to ensure valid and reliable scores are produced, but also should consider the ethical and legal requirements in relation to data collection, data storage, data reporting, data access etc. It is advised that Gaelic games develop appropriate policies and procedures to ensure a high level of practice that protects all individuals involved in the process.

Summary

Effective player development pathways should, where possible, address the whole gamut of factors that will affect performance and long-term participation in the Gaelic games. Athleticism is one such factor; consequently, effective LTAD strategies should play an integral role in all player pathways. Crucially, these must be seen as organic in nature – sufficiently guided but with the flexibility to allow them to be integrated into player pathways at multiple levels. This action statement has been designed to provide an overarching framework that can help guide application. As this approach develops, it will be supplemented by activity examples and an education framework that will facilitate application. It is hoped that this will be an important step in developing the Gaelic games players of the future, players who will possess all the skills and capacities to enjoy a lifetime of productive and enjoyable physical activity.

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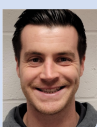
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