Long-Term Athlete Development 2.0

# Canadian Sport for Life

CANADIAN SPORT FOR LIFE

*quality sport & physical activity*

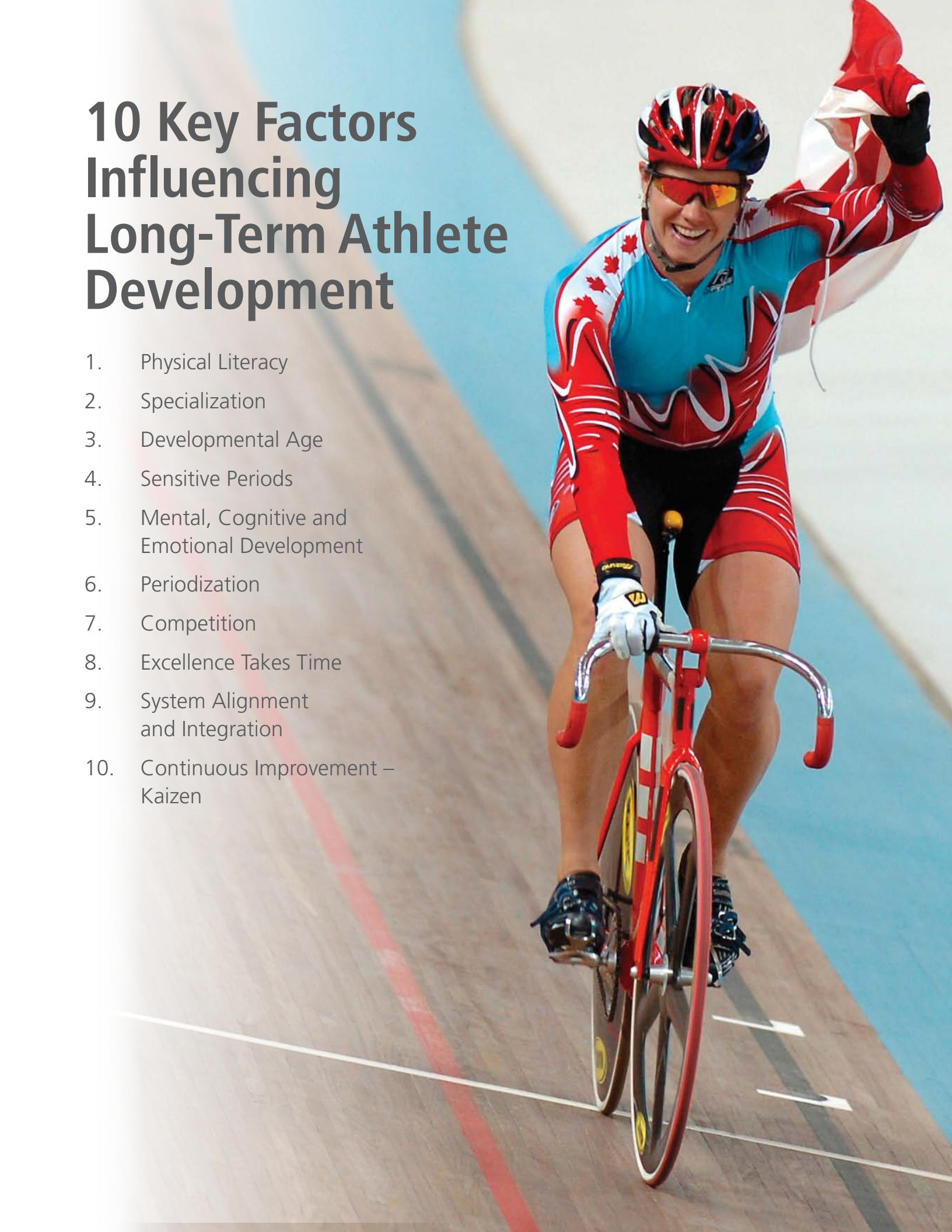
**Figure 1:**

# Long-Term Athlete Development Framework


**LTAD.ca**
**canadiansportforlife.ca**

# 10 Key Factors Influencing Long-Term Athlete Development

1. Physical Literacy
2. Specialization
3. Developmental Age
4. Sensitive Periods
5. Mental, Cognitive and Emotional Development
6. Periodization
7. Competition
8. Excellence Takes Time
9. System Alignment and Integration
10. Continuous Improvement – Kaizen



# An Outline of Long-Term Athlete

## Active Start

Chronological Age
Males and Females 0-6

- Development of general movement skills
- Not sedentary for more than 60 minutes except when sleeping
- Some organized physical activity
- Exploration of risk and limits in safe environments
- Active movement environment combined with well-structured gymnastics and swimming programs
- Daily physical activity with an emphasis on fun

## FUNdamentals

Chronological Age
Males 6-9 and Females 6-8

- Overall movement skills
- General, overall development
- Integrated mental, cognitive and emotional development
- ABCs of athleticism: agility, balance, coordination and speed
- ABCs of athletics: running, jumping, throwing and wheeling for wheelchair sports
- Develop strength through use of own body weight exercises
- Introduce simple rules of fair play and ethics of sport
- Well-structured programs without periodization
- Daily physical activity, still emphasizing fun

# Development

## Learn to Train

Chronological / Developmental Age
Males 9-12 and Females 8-11

- Overall sport skills development
- Major skill learning stage: all basic sport skills should be learned before entering puberty or the Train to Train stage
- Integrated mental, cognitive and emotional development
- Introduction to mental preparation
- Develop strength through use of own body weight, adding medicine ball and Swiss ball
- Introduce ancillary capacities
- Further identification and development of talents
- Single or double periodization
- Sport-specific training three times per week; participation in other sports three times per week

## Train to Train

Chronological / Developmental Age
Males 12-16 and Females 11-15

- Sport-specific skill development
- Major fitness development stage: aerobic, speed and strength
- The onset of the growth spurt, peak height velocity (PHV) (the fastest rate of growth after growth decelerates) and the onset of menarche are the biological markers
- Build the physical and mental engine
- Integrated mental, cognitive and emotional development
- Introduce free weights
- Develop ancillary capacities
- Frequent musculoskeletal evaluations during growth spurt
- Talent identification and selection
- Single or double periodization
- Sport-specific training six - nine times per week, including complementary sports

# An Outline of Long-Term Athlete

## Train to Compete

Chronological / Developmental Age
Males 16-23 +/- and Females 15-21 +/-

- Sport-, event-, position-specific physical conditioning
- Sport-, event-, position-specific technical tactical preparation
- Sport-, event-, position-specific technical and playing skills under competitive conditions
- Integrated mental, cognitive and emotional development
- Advanced mental preparation
- Optimize ancillary capacities
- Specialization
- Single, double or triple periodization
- Sport-specific technical, tactical and fitness training 9-12 times per week

## Train to Win

Chronological Age
Males 19 +/- and Females 18 +/-

- Ages are sport-specific and based on national and international normative data, which represents the average score for a certain factor across various levels of performance (height, weight, etc.)
- Maintenance or improvement of physical capacities
- Further development of technical, tactical and playing skills
- Modelling all possible aspects of competition in training
- Frequent preventative breaks
- Maximize ancillary capacities
- Performance on demand
- Single, double, triple or multiple periodization
- Sport-specific technical, tactical and fitness training 9-15 times per week

# Development


## Active For Life

Enter at any time after the onset of the growth spurt

Active for Life constitutes three participant-based streams: **Competitive for Life, Fit for Life** and **Sport and Physical Activity Leaders.** Participants may be active in multiple streams depending on their involvement in sport and physical activity.

### Competitive for Life

- Minimum of 60 minutes moderate daily activity or 30 minutes of intense activity for adults
- Transfer from one sport to another
- Move from highly competitive sport to lifelong competitive sport including age group competition
- Embrace an active lifestyle by participating in organized sport that may be unfamiliar
- Compete at a high level in age-group competitions such as Masters Games

### Fit for Life

- Minimum of 60 minutes moderate daily activity or 30 minutes of intense activity for adults
- Move from competitive sport to recreational activities
- Move to sport careers or volunteering
- Maintain an active lifestyle by continuing to participate in organized or non-organized physical activity
- Become active by participating in non-organized sport or physical activity that may be unfamiliar

### Sport and Physical Activity Leaders *

- Move from competitive sport to volunteering as coaches, officials or administrators
- Upon retiring from competitive sport, move to sport-related careers such as coaching, officiating, sport administration, small business enterprises or media
- Use experience, whether from previous involvement or education, to help ensure a positive environment for participants

* *Active for Life if physical literacy is achieved before the Train to Train stage*


12
12
10

Long-Term Athlete Development through

# Canadian Sport for Life

LTAD 2.0

Planning for the wellness and sport excellence of Canadians.

## Contents

# Preface

In 2002, Canadian Federal, Provincial and Territorial (F-P/T) ministers adopted the Canadian Sport Policy, a commitment to enhance participation, excellence, capacity and interaction in Canadian sport, with the vision of "A dynamic and leading-edge sport environment that enables all Canadians to experience and enjoy involvement in sport to the extent of their abilities and interests and, for increasing numbers, to perform consistently and successfully at the highest competitive levels."
(Canadian Sport Policy, 2002).

As a step toward this vision, Sport Canada – the Canadian governmental agency responsible for sport, from general participation to high performance – invested in Canadian Sport for Life (CS4L) and its core Long-Term Athlete Development (LTAD) framework.

Beginning in 2005, Sport Canada assembled an Expert Group to lead the process and Canadian Sport Centres published the *Canadian Sport for Life – Long-Term Athlete Development Resource Paper (Balyi, Way, Higgs, Norris, & Cardinal, 2005).* This document provided a framework and philosophy for promoting lifelong engagement in sport and physical activity for all Canadians, while also revitalizing Canada as a competitive force in the international arena. Since that time, the Canadian Sport for Life Expert Group has worked to facilitate the development of Long-Term Athlete Development frameworks and associated materials for each of the federally supported National Sport Organizations (NSOs). In addition, the Expert Group, now the Canadian Sport for Life Leadership Team, has created dozens of supporting resources to deepen the understanding of Canadian Sport for Life – Long-Term Athlete Development across Canada and around the world. The science and coaching practices that were the basis for the original document have continued to evolve. The original document fulfilled its purpose of engaging Canada's sport, recreation, education and health leaders in an ongoing dialogue about what "quality" sport means and looks like.

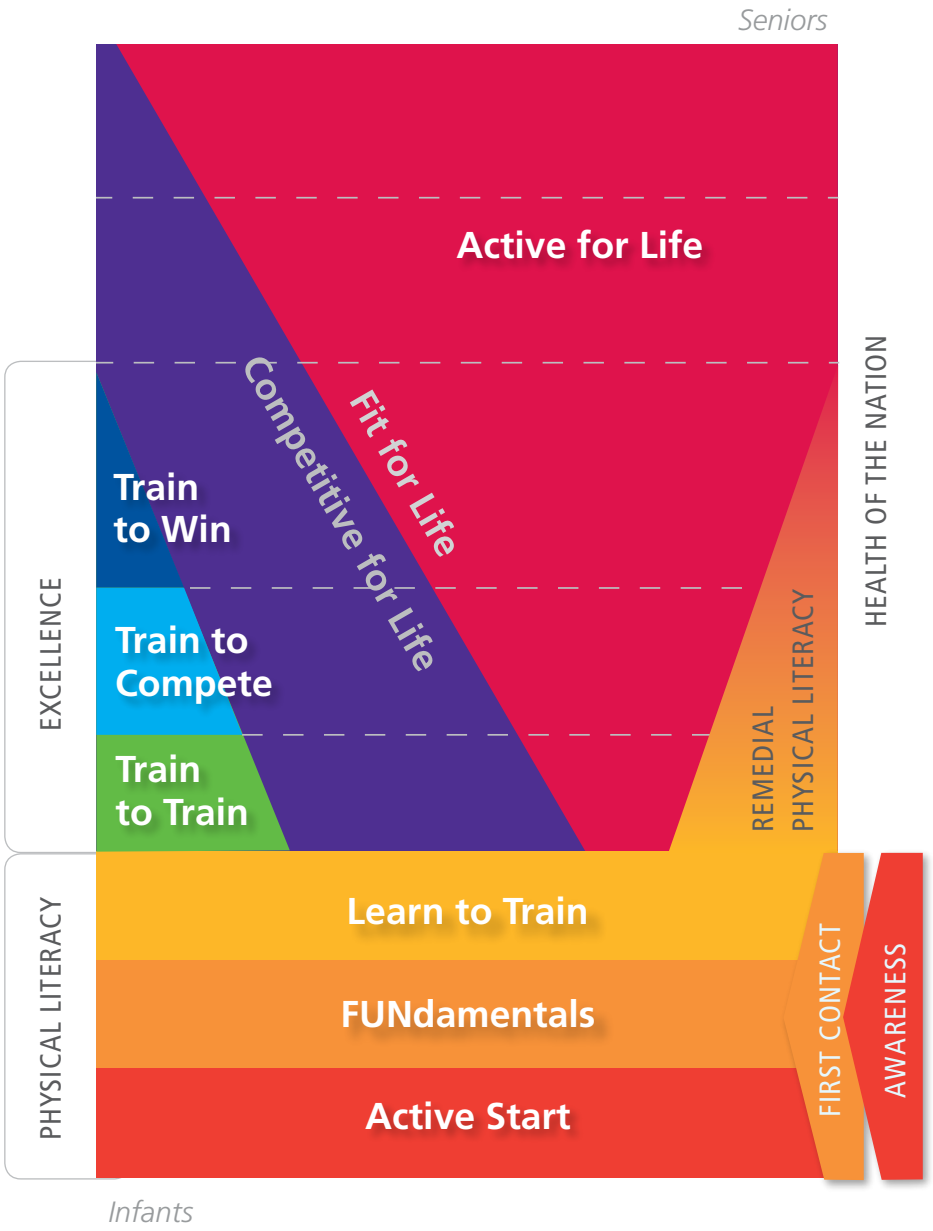
Canadian Sport for Life has evolved from a project to a national movement dedicated to improving the quality of sport and physical activity in Canada. Canadian Sport for Life links sport, education, recreation and health, and aligns community, provincial and national programming.

Alongside Long-Term Athlete Development, Canadian Sport for Life represents a paradigm shift in the way Canadians lead and deliver sport and physical activity.

In June 2012, Canada's F-P/T sports ministers endorsed a renewed Canadian Sport Policy for 2012-2022 (CSP 2012). While the first Policy was a catalyst for the Canadian Sport for Life movement, CSP 2012 fully integrates Canadian Sport for Life – Long-Term Athlete Development. The policy goals of CSP 2012 incorporate the key outcomes of Physical Literacy, Excellence and Active for Life that are foundational to Canadian Sport for Life – Long-Term Athlete Development.

Now, Canadian Sport for Life – Long-Term Athlete Development is written into Canada's Sport Policy "roadmap," and concepts such as physical literacy and the Long-Term Athlete Development stage names (e.g. "Learn to Train," "Train to Compete") are included throughout the policy to guide the understanding of readers. Canadian Sport for Life – Long-Term Athlete Development has become the organizational paradigm of Canadian sport. Yet even in that short time sport has continued to evolve, and so has the Canadian Sport for Life – Long-Term Athlete Development framework. Thousands of sport leaders and researchers world-wide have contributed to Canadian Sport for Life – Long-Term Athlete Development by learning how to practically implement it, extend it into new areas, critically analyze its underlying principles, and build an evidence base that supports the benefits of the Long-Term Athlete Development approach.

**Figure 2: The Progression of Long-Term Athlete Development Through Canadian Sport for Life**




This resource is an update on Canadian Sport for Life – Long-Term Athlete Development that, in the spirit of "Kaizen" or continuous improvement, builds on the original 2005 Canadian Sport for Life – Long-Term Athlete Development Resource Paper. It reflects both newer information and lessons learned as Canada has worked to implement fundamental changes in the way quality sport is designed and delivered within the sport, education, recreation and health sectors. It is a work in progress and, as such, will continue to evolve.

# Executive Summary

The Canadian Sport for Life movement aims to improve the quality of sport and physical activity in Canada by addressing overall sport and physical activity from policy to program delivery. Establishing quality programs based on developmentally appropriate sport and physical activity will improve the health, wellness and sporting experiences of all Canadians. The results will be physical literacy, improved performance and increased lifelong participation in physical activity.

The planned outcomes of Canadian Sport for Life include Physical Literacy, Excellence and Active for Life. Physical Literacy is the foundation for both Active for Life and Excellence. Individuals who are physically literate move with competence and confidence in a wide variety of physical activities that benefit healthy development. These individuals are able to effectively demonstrate an array of basic human movements, fundamental movement skills and fundamental sports skills across a range of physical environments. They develop the motivation and ability to understand, communicate, apply and analyze different forms of movement. This enhances their physical and psychological wellness, allowing them to pursue sport excellence based on their ability and motivation. Physical literacy is the cornerstone for both participation in physical activity and excellence in sport, and has been adopted as the foundation of the Sport for Life concept in Canada.

Active for Life is the third key outcome of Canadian Sport for Life. Active for Life is the name of Long-Term Athlete Development's seventh stage, but it is also a major goal for the Canadian Sport for Life movement. This stage can be entered at any age after the development of physical literacy during childhood and youth, and may include being Competitive for Life (where Canadians are active for life through participation in competitive sport), Fit for Life (where Canadians are active for life through participation in recreational physical activity), and/or Sport and Physical Activity Leaders (where Canadians contribute to the sport and physical activity experience as coaches or instructors, officials, either professional or volunteer administrators, or through sport science and medicine).

A central component of the Canadian Sport for Life movement is Long-Term Athlete Development – a multi-stage training, competition and recovery pathway that guides an individual's experience in sport and physical activity from infancy through all phases of adulthood. Long-Term Athlete Development is a framework for developmentally appropriate programs that increase participation and optimize performance. Long-Term Athlete Development uses a holistic approach that considers mental, cognitive and emotional development combined with physical development, ensuring each athlete develops as a complete person.

Canadian Sport for Life – Long-Term Athlete Development describes how the Canadian sport system can best accommodate the needs for increased activity and sporting achievement for those with physical, sensory and intellectual disabilities. While not everyone with a disability will pursue excellence, this should not exclude them from opportunities to develop physical literacy and become active for life.

The seven stages of Long-Term Athlete Development are Active Start, FUNdamentals, Learn to Train, Train to Train, Train to Compete, Train to Win and Active for Life. The first three stages combined form the physical literacy base upon which the excellence stream (Train to Train, Train to Compete and Train to Win) and lifelong engagement in physical activity (Active for Life) are built. Athletes with a disability have two additional stages of Long-Term Athlete: Awareness and First Contact. They are particularly important for individuals with an acquired disability who may not have been aware of sport and physical activity for persons with a disability.

**CS4L** is a movement to improve the quality of sport and physical activity in Canada. CS4L links sport, education, recreation and health and aligns community, provincial and national programming.

**LTAD** is a multi-stage training, competition and recovery pathway guiding an individual's experience in sport and physical activity from infancy through all phases of adulthood.

CS4L, with LTAD, represents a paradigm shift in the way Canadians lead and deliver sport and physical activity in Canada.


**Figure 3: The Principles & Values of Canadian Sport for Life and Long-Term Athlete Development**

1. Life has significant stages of development that include transitions from child to adolescent, to adult, and then to senior, resulting in changed capabilities.
2. Training, competition and recovery programs should be based on the stage of the participant's capability, rather than chronological age.
3. For optimal development, sport programs must be designed for the stage of development and gender of the participant.
4. Physical literacy is the basis of lifelong participation and excellence in sport and engagement in health enhancing physical activity.
5. Every child is an athlete and, therefore, is genetically predisposed to be active if the environment encourages participation.
6. Lifelong participation and excellence in sport are best achieved by participating in a variety of sports at a young age, then specializing later in development.
7. There are sensitive periods during which there is accelerated adaptation to training during pre-puberty, puberty and early post-puberty.
8. A variety of developmental, physical, mental, cognitive and emotional factors affect the planning of optimal training, competition and recovery programs.
9. Providing guidance through the complete spectrum of LTAD stages of sport and physical activity will result in increased participation and performance.
10. Mastery in sport develops over time, through participation in quality sport and physical activity programs.
11. LTAD is participant/athlete-centered, coach-led, and organization supported, taking into account the demands of home, organized sport, community recreation and school.
12. Through cooperation and collaboration within sports (at all levels) and between sports, a more effective sport system can be achieved.
13. The integrated efforts of high-performance sport, community sport, school sport, school physical education, and municipal recreation will have a mutually positive benefit for all.
14. Quality sport and physical activity, combined with proper lifestyle, result in better health, disease prevention, enhanced learning, enjoyment, and social interaction; leading to improved wellness.
15. Sport practices, scientific knowledge and societal expectations are ever changing and, therefore, LTAD needs to continually adapt and improve.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Daegu 2011

# Overview

This resource paper describes a seven-stage Canadian framework of LTAD, for which CS4L is the vehicle. LTAD is a training, competition and recovery program based on developmental age — the maturation level of an individual — rather than chronological age. It is athlete-centred, coach driven and administration, sport science and sponsor supported. The CS4L – LTAD framework is inclusive, addressing the needs of those individuals with a disability. Persons with physical, sensory and intellectual disabilities confront both individual challenges and special opportunities in pursuing sport and physical activity. CS4L – LTAD has quickly become the organizing paradigm for Canadian sport.

## Long-Term Athlete Development:

- is based on the physical, mental, emotional and cognitive development of children and adolescents. Each stage reflects a different point in athlete development.
- ensures physical literacy upon which excellence and lifelong participation in sport and physical activity can be built and
  a) is promoted through quality daily physical activity in the schools and a common approach to developing physical abilities through community recreation and elite sport programs;
  b) recognizes the need to involve all Canadians in LTAD, including athletes with a disability.
- ensures that developmentally appropriate skill development, training, competition and recovery programs are provided throughout an athlete's career.
- provides developmentally appropriate and meaningful competition structure throughout the stages of an athlete's development.
- impacts the entire sport community, including participants, parents, coaches, schools, clubs, community recreation programs, provincial sport organizations (PSOs), national sport organizations (NSOs), sport scientists, municipalities, and government ministries and departments (particularly but not exclusively in the portfolios of health and education) at the provincial/territorial and federal levels.
- integrates and aligns high performance sport, community sport, recreational physical activity, scholastic sport and physical education in schools.
- is "made in Canada", recognizing international best practices and responding to research findings.
- promotes a healthy, physically literate nation whose citizens participate in lifelong physical activity.

# Introduction

Sport and physical activity can be a powerful force for individual and social growth and development, or they can fall short. CS4L is based on the belief that quality sport and physical activity possess unique attributes to enable the development of healthy individuals, who, in turn, can make positive contributions to society. For CS4L, quality sport means sport delivered with a focus on the optimal holistic development of each individual by using a developmentally appropriate approach. It is inclusive, accessible and ethical, placing priority on long-term success over short-term gains.

Quality sport is based upon a unified vision and one system for building and linking the strengths of organizations and institutions at the national, provincial and local level. The CS4L movement builds on the 10 Key Factors of LTAD as the necessary basis for such a system.

The LTAD framework was influenced by an analysis of the empirically tested athlete development models from the former East Bloc countries, with all the positive and negative aspects of those models. In addition, the sport sciences have provided insight and information regarding the role of growth, development and maturation in athletic development. As well, the mental, cognitive, emotional and psycho-social readiness of children is an important component of young athlete development. These sciences include pediatric exercise science, exercise physiology, sport psychology, psychomotor learning, sport sociology and nutrition. An analysis of the literature on organizational development has also contributed significantly. The science behind LTAD has been tested, and a number of countries and organizations around the world have adopted it as their sport framework.

This document is based on and supported by the coaching and exercise science literature, but it is written particularly for coaches, and technical and administrative sport leaders. Although some of the generalizations may seem to be too vague from a scientific point of view, our extrapolations are drawn because decisions must be made, despite the lack of scientific studies and data in the area. Thus, the art of coaching plays a significant role in our framework.

Additional information on LTAD for athletes with a disability is addressed in a separate resource, No Accidental Champions *(Higgs, Bluechardt, Balyi, Way, Jurbala & Legg, 2011).* Other resources have been developed over the past eight years as well and can be found in the CS4L Resource Documents and Additional Resources sections toward the end of this document.

> "The health and wellness of the nation and the medals won at major Games are simple by-products of an effective sport system."
>
> – Istvan Balyi

# Sport System Alignment and Integration

The need for LTAD arises in part from the fluctuating international performances of Canadian athletes in some sports and the challenge other sports are having in identifying and developing the next generation of internationally successful athletes. In addition, participation in recreational sport and physical activity has been declining and physical education programs in the schools are being marginalized.

LTAD is a paradigm shift, a vehicle, a tool for change. It differs from other athlete development models because it acknowledges that physical education, school sports, competitive sports and recreational activities are mutually interdependent and should be coordinated and developed in a collaborative manner.

LTAD also positively affects the quality of training and competition by taking into consideration factors such as developmental age and sensitive periods of optimal trainability. It builds athleticism, beginning with a foundation of fundamental movement skills and introduces fitness and sport skills at the appropriate developmental age. **Figure 4** illustrates the recommended support system interrelationship between physical education, recreation and podium performance.

CS4L – LTAD stood in sharp contrast to the Canadian sport system of the early 21st century. Traditionally, physical education in the schools, recreational sports and elite sport have been developed and supported separately. This approach is ineffective and expensive. It fails to ensure that all children, including those who may choose to become elite athletes, are given a solid foundation and appropriate knowledge base regarding the physical, technical, tactical and mental aspects of performance, matched up with the life skills upon which to build their athletic abilities.

LTAD is an inclusive framework that encourages individuals to get involved in lifelong physical activity. It does this by connecting and integrating physical education programs in the school system with elite sport programs and with recreational sport programs in the community. CS4L – LTAD provides a strong foundation of necessary knowledge in all aspects of performance and life skills, and ensures that all children correctly learn the fundamental movement skills, since all children attend school. It also ensures that these skills are introduced during the optimum point in their physical development, which is prior to age 11 for girls and age 12 for boys, or more precisely, before the onset of the adolescent growth spurt. Children who are physically literate will:

- feel confident and be encouraged to continue to build on these skills through competitive and recreational sport activity.
- enjoy overall health benefits by developing greater physical literacy, which encourages them to be more physically active throughout their lives. Increased activity helps stem the current rise in childhood and adult obesity and reduces cardiovascular disease.
- be prepared to enter a pathway to higher-level competition and eventually excellence at the international level.

**Figure 4: Circle of a Physically Active Life**

# Long-Term Athlete Development consists of seven stages

Most sports have a seven-stage framework of LTAD, although there are some exceptions, with each sport having refined the framework to best suit its unique demands and sport career pathway.

| The first three LTAD stages encourage physical literacy and sport for all: | The next three stages focus on excellence: | The final stage encourages lifelong physical activity: |
|---|---|---|
| **1. Active Start** | **4. Train to Train** | **7. Active for life** |
| **2. FUNdamentals** | **5. Train to Compete** | **a. Competitive for Life** |
| **3. Learn to Train** | **6. Train to Win** | **b. Fit for Life** |
| | | **c. Sport and Physical Activity Leaders** |

Some sports have the additional stages of Learn to Compete, Learn to Win and/or Win for Living. Sports involving persons with a disability have two additional stages: Awareness and First Contact/Recruitment.

- **Awareness –** Because sporting opportunities for persons with a disability are not always well known, sports need to develop awareness plans to make their offerings known to prospective athletes with a disability.
- **First Contact/Recruitment –** Sports have one chance to create a positive and welcoming environment for potential athletes with a disability. It may not be easy for individuals to make the first approach to a sport, and if they don't have a positive first experience, they may be lost to the sport and to a healthy lifestyle.

# Shortcomings and Consequences

Before CS4L – LTAD can be implemented successfully, the many shortcomings and subsequent consequences that are impeding the Canadian sport system must be reviewed.

## Shortcomings

What are the shortcomings?

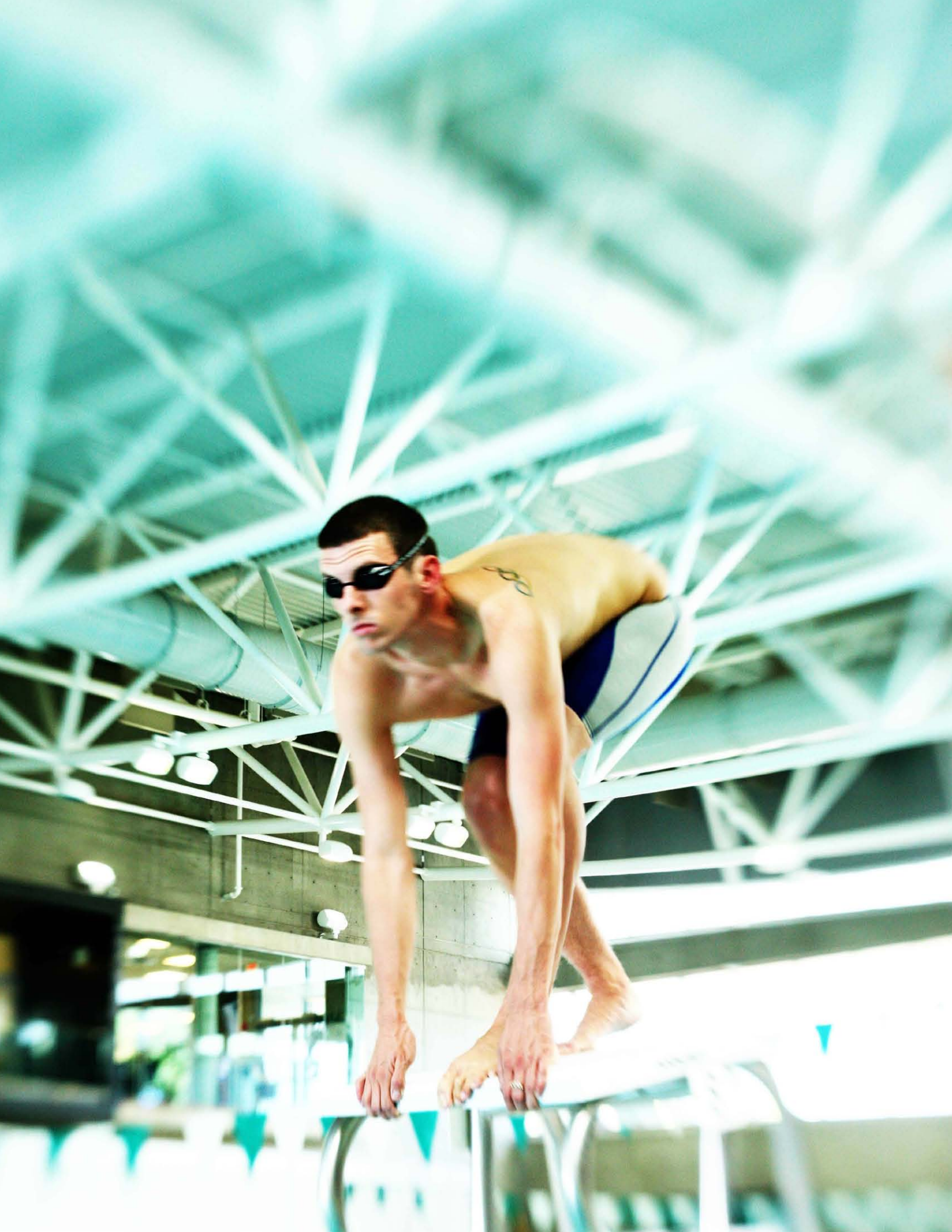
- Developmental athletes over-compete and under-train in many sports.
- Adult training and competition programs are superimposed on young developing athletes.
- Training programs designed for male athletes are superimposed on female athletes.
- Preparation is geared to the short-term outcome – winning – and not to the process of developing the athlete.
- Chronological rather than developmental age is used in training and competition planning
- Coaches largely neglect the sensitive periods of accelerated adaptation to training.
- Fundamental movement skills and fundamental sports skills are not taught properly.
- The most knowledgeable coaches work at the elite level, while less knowledgeable volunteers often coach at the developmental level where quality, trained coaches are essential for optimum athlete development.
- Parents are not educated about physical literacy and CS4L – LTAD.
- The developmental training needs of athletes with a disability are not well understood.
- In most sports, the competition system interferes with athlete development.
- Talent identification, talent development and talent transfer are poorly understood and misused.
- There is no integration between physical education programs in the schools, recreational community programs and elite competitive programs.
- Sports encourage athletes to specialize too early in an attempt to attract and retain participants.

## Consequences

What are the results of these shortcomings?

- Poor movement abilities and athleticism.
- Lack of proper fitness.
- Limited skill development due to under-training.
- Poor habits developed from over-competition focused on winning.
- Female athletes may not reach full potential due to inappropriate programs.
- Children not having fun as they play adult-based programs.
- A lack of systematic development in the next generation of international athletes.
- Athletes pulled in different directions by school, club and provincial teams because of the structure of competition programs.
- Remedial programs, implemented by provincial and national team coaches, to counteract the shortcomings of athlete preparation.
- Fluctuating national performance due to poor understanding of talent development, identification and transfer within a developmental pathway.
- Athletes failing to reach their genetic potential and optimal performance level.
- Failure to reach optimal performance levels in international competitions.

The shortcomings and consequences should be seriously considered by program planners.



# The 10 Key Factors Influencing Long-Term Athlete Development

The following factors are the key components upon which LTAD is built.

1

## Physical Literacy

Physical literacy is the cornerstone of both participation and excellence in physical activity and sport. Individuals who are physically literate are more likely to be active for life.

- Becoming physically literate is influenced by the individual's age, maturation and capacity.
- Ideally, supporting the development of physical literacy should be a major focus prior to the adolescent growth spurt.
- The skills that make up physical literacy vary by location and culture, and depend on how much importance a society places on certain activities.

**Physically literate individuals:**

- Demonstrate a wide variety of basic human movements, fundamental movement skills and fundamental sports skills,
- Move with poise, confidence, competence and creativity in different physical environments (on the ground, both indoor and outdoor; in the air; in and on water; on snow and ice).
- Develop the motivation and ability to understand, communicate, apply and analyze different forms of movement.
- Make choices that engage them in physical activity, recreation or sport activities that enhance their physical and psychological wellness, and permit them to pursue sport excellence commensurate with their ability and motivation.

**Table 1: Fundamental Movement Skills that Underpin Physical Literacy**
The list is not exhaustive but gives a good idea of the major movement skills across the three skill groups and four physical environments.

| Locomotor Skills | Object Control Skills | Balance Movements |
|---|---|---|
| • Boosting | **Sending:** | • Balancing/centering |
| • Climbing | • Kicking | • Body Rolling |
| • Eggbeater | • Punting | • Dodging |
| • Galloping | • Rolling (ball) | • Eggbeater |
| • Gliding | • Striking (ball, puck, ring) | • Floating |
| • Hopping | • Throwing | • Landing |
| • Ice Picking | **Receiving:** | • Ready position |
| • Jumping | • Catching | • Sinking/falling |
| • Leaping | • Stopping | • Spinning |
| • Poling | • Trapping | • Stopping |
| • Running | **Travelling with:** | • Stretching/curling |
| • Sculling | • Dribbling (feet) | • Swinging |
| • Skating | • Dribbling (hands) | • Twisting/turning |
| • Skipping | • Dribbling (stick) | |
| • Sliding | **Receiving and Sending:** | |
| • Swimming | • Striking (with a bat) | |
| • Swinging | • Striking (with a racquet) | |
| • Wheeling | • Striking (with a stick) | |
| | • Volleying (with limbs) | *Lists adapted from Jess (1999)* |

The basic movement skills identified above can be developed through the following four activities. In combination, they provide a base for all other sports.

1. Athletics: run, jump, throw.
2. Gymnastics: ABCs of athleticism (agility, balance, coordination and speed). Including dance adds to rhythmic abilities.
3. Swimming: for water safety reasons; for balance in a buoyant environment; and as the foundation for all water-based sports.
4. Skating, slip and slide movements: on ice, snow or water, the need to develop stability is required.

Without the basic movement skills, a child will have difficulty participating in any sport. For example, to enjoy baseball, basketball, cricket, football, netball, handball, rugby and softball, the simple skill of catching must be mastered.

Fundamental movements skills and fundamental sports skills should be introduced through fun activities and short games. At the FUNdamentals stage, it is critical to provide many opportunities for children to explore their movement potential in a safe environment.

**Figure 5: Fundamental Movement Skils and Fundamental Sports Skills**


Agility


Balance


Co-ordination


Speed


Jumping


Climbing


Walking


Skating


Hopping


Swimming


Skipping


Balance


Throwing


Dribbling


Kicking


Throwing


Hitting


Catching

It is critical that children with a disability have the opportunity to develop their fundamental movement skills and fundamental sports skills. By doing so, they are more likely to be included in many school-, community- or club-based activities. Failure to do so severely limits their lifelong opportunities for participation in many physical activities and sport. Children with a disability face difficulty gaining the fundamentals because:

- overly protective parents, teachers and coaches shield them from the bumps and bruises of childhood play;
- adapted physical education is not well developed in all school systems;
- some coaches do not welcome children with a disability to their activities because of a lack of knowledge about how to adapt their program and design integrative skills, drills and games.

It takes knowledge and creativity to integrate a child with a disability into group activities where fundamental skills are practiced and physical literacy is developed.

2

# Specialization

Sports can be classified as either early or late specialization. Well-known early specialization sports include artistic and acrobatic sports such as gymnastics, diving and figure skating. These differ from late specialization sports in that very complex skills are learned before maturation since they cannot be fully mastered if taught after maturation.

Most other sports are late specialization sports; however, all sports should be individually analyzed using international and national normative data to determine whether they are early or late specialization. If physical literacy is acquired before maturation, athletes can select a late specialization sport when they are between the ages of 12 and 15 and have the potential to rise to international stardom in that sport.

Based on sport-specific work done by more than 100 organizations around the world, experts from the sport-specific groups indicated when sport specialization is recommended. This has allowed groupings of sports within early and late specializations.

**Early Specialization**

- Acrobatic (gymnastics, diving, figure skating)
- Highly kinesthetic (important to engage in activities that involve snow, water or a horse early on e.g. snowboard, swimming, synchro, equine)
- Demanding and complex motor skill requirement

**Late Specialization**

- Early Engagement
  - Kinesthetic (alpine ski, freestyle ski, luge, cross country ski)
  - Team (basketball, ice hockey, baseball, rugby, soccer, water polo, field hockey)
  - Visual (tennis, badminton, squash, fencing)
- Standard (typical timing of specialization – majority of sports fit into this category)
- Very Late Specialization (cycling, wakeboard)
- Very Late Specialization; Transfer – when the skills developed in one sport allow an athlete to smoothly transition into another sport (rowing, triathlon, volleyball – beach and indoor, bobsleigh)

Specializing early on in a single, late specialization sport contributes to:

- One-sided, sport-specific preparation
- Lack of ABCs, poor basic movements and fundamental sports skills
- Overuse injuries
- Early burnout
- Early retirement from training and competition

Disability sports are typically late specialization sports. It is imperative that children with a congenital disability or early-acquired disability be exposed to the full range of fundamental movement skills and fundamental sports skills before specializing in the sport of their choice. For older athletes who acquire a disability, it is important that they again pass through the stages of Active Start, FUNdamentals and Learn to Train – using the capacities that their disability permits – and be exposed to a variety of sports before specializing in only one sport.

3

# Developmental Age

Children of the same chronological age can differ by several years in their level of biological maturation. Growth, development and rate of maturation is the result of a complex interaction of genes, hormones, nutrients and the environments (physical and psychosocial) in which the individual lives. This combination of factors regulates the child's physical growth, neuromuscular development, sexual maturation, mental, cognitive and emotional development, and general physical metamorphosis during the first two decades of life.

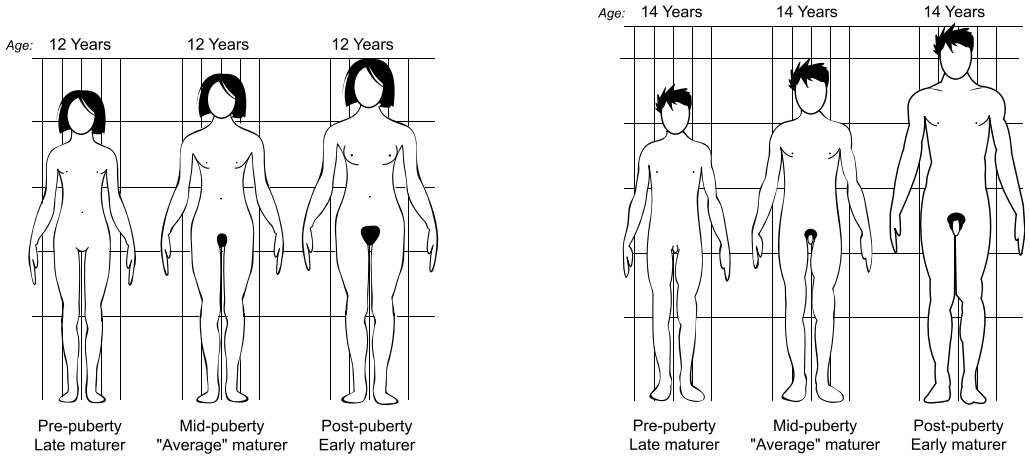
Puberty is characterized by numerous physical changes by which a child's body matures into an adult body capable of sexual reproduction. These events occur over a number of years and include major changes to height, deposition of fat, bone and muscle, transformation of the brain, and acquisition of secondary sexual characteristics (e.g. breast, genitalia, pubic and auxiliary hair growth).

The terms "growth" and "maturation" are often used together and sometimes synonymously. However, each refers to specific biological activities.

- **Growth** refers to observable step-by-step changes in quantity and measurable changes in body size such as height, weight, and fat percentage.
- **Maturation** refers to qualitative system changes, both structural and functional, in the body's progress toward maturity such as the change of cartilage to bone in the skeleton.

Development refers to both biological and behavioural contexts. In terms of the biological, "development refers to the processes of differentiation and specialization of pluripotent embryonic stem cells into different cell types, tissues, organs and functional units" *(Malina, Bouchard, & Bar-Or, 2004, p. 5).* For behavioural, this term "relates to the development of competence in a variety of interrelated domains as the child adjusts to his or her cultural milieu – the amalgam of symbols, values and behaviours that characterize a population" (p. 5).

**Figure 6: Maturation in Girls and Boys** (Adapted from "Growing Up" by J.M. Tanner Scientific American 1973)




**Age-related terms used in Long-Term Athlete Development:**

- **Chronological age** refers to the number of years and days elapsed since birth. Children of the same chronological age can differ by several years in their level of biological maturation.
- **Relative age** refers to differences in chronological age among children born in the same sport program year. For example, a sport may have age-group classification based on age on December 31st of a year, and this can lead to an athlete born in December being almost one year less developed than an athlete born in January.
- **Developmental age** refers to the degree of physical, mental, moral, cognitive and emotional maturity. Physical developmental age can be determined by skeletal maturity or bone age. Mental, moral, cognitive and emotional maturity are more difficult to determine.
- **Skeletal age** refers to the maturity of the skeleton determined by the degree of ossification of the bone structure. It is a measure that takes into consideration how far given bones have progressed toward maturity, not in size, but with respect to the progressive change from cartilage to bone.
- **Training age** refers to the age where athletes begin planned, regular, serious involvement in training.

  **General training age** refers to the number of years in training in different sports.

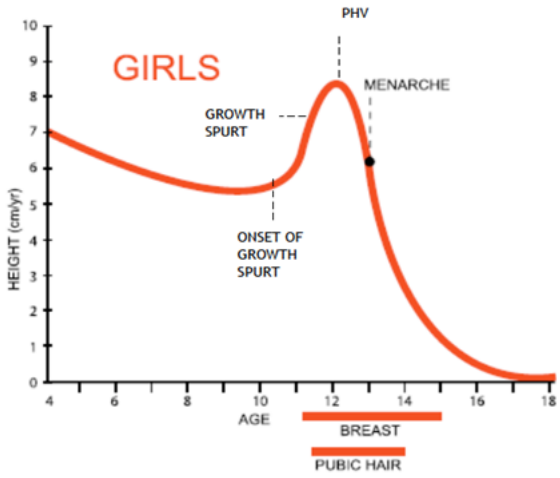
  **Sport-specific training age** refers to the number of years an athlete has been training in one particular sport.

The tempo of a child's growth has significant implications for athletic training because children who mature at an early age have a major advantage during the Train to Train stage compared to average or late maturers. However, after all athletes have gone through their growth spurt, it is often the late maturers who have greater potential to become top athletes provided they experience quality coaching throughout that period.

LTAD requires the identification of early, average and late maturers in order to design appropriate training and competition programs in relation to optimal trainability and readiness. The beginning of the growth spurt and the peak of the growth spurt (Peak Height Velocity) are significant landmarks for LTAD applications of training and competition design.

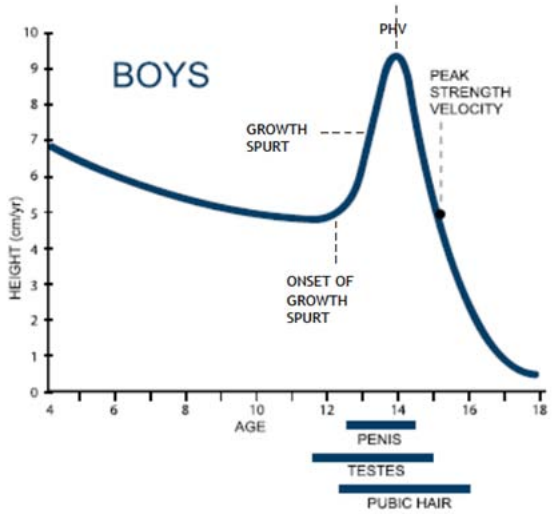
Specific disabilities may dramatically change the timing and sequence of childhood and adolescent development.

**Figure 7: Maturity Events in Girls** (Adapted and modified from Ross & Marfell-Jones, 1982)




Peak Height Velocity (PHV) in girls occurs at about 12 years of age. Usually the first physical sign of adolescence is breast budding, which occurs slightly after the onset of the growth spurt. Shortly thereafter, pubic hair begins to grow. Menarche, or the onset of menstruation, occurs rather late in the growth spurt, after PHV is achieved. Peak Strength Velocity (PSV) comes immediately after PHV, or at the onset of menarche (usually a year after PHV).The sequence of developmental events may normally occur two or even more years earlier or later than average.

**Figure 8: Maturity Events in Boys** (Adapted and modified from Ross & Marfell-Jones, 1982)




PHV in boys is more intense than in girls and, on average, occurs about two years later. Growth of the testes, pubic hair and penis are related to the maturation process. PSV comes 12 to 18 months after PHV. Thus, there is pronounced late gain in strength characteristics of the male athlete. As with girls, the developmental sequence for male athletes may occur two or more years earlier or later than average. Early maturing boys may have as much as a four-year physiological advantage over their late-maturing peers. Eventually, the late maturers will catch up when they experience their growth spurt.

Currently, most athletic training and competition programs are based on chronological age. However, athletes of the same age between ages 10 and 16 can be three to five years apart developmentally *(Borms, 1986).* Thus, chronological age is a poor guide to segregate adolescents for competitions.

Sports need to develop strategies that will encourage late maturing boys to remain in sport until they have caught up developmentally with their early maturing peers, who because of their increased size and strength have a competitive advantage. For girls, there is a need to develop strategies to retain early developers in programs until the competitive disadvantage of wider hips and breast development is reduced as late developers also obtain more adult body shapes.


4

# Sensitive Periods

A sensitive period is a broad timeframe or window of opportunity when the learning of a specific skill or the development of a specific physical capacity is particularly effective. The entire period of childhood can be viewed as a sensitive period for mastering fundamental movement skills (Gallahue and Donnelly, 2003).

Trainability during the sensitive periods of accelerated adaptation to training refers to the body's responsiveness to training stimuli at different stages of growth and maturation. The physiological systems of the athlete can be trained at any age, but there are sensitive periods when individuals are especially responsive to specific types of training.

The sensitive periods of accelerated adaptation to training that occur before adolescence are based on chronological age, while those that occur during or after adolescent growth are based on their relationship to maturational markers *(Balyi, 2001),* such as the onset of the adolescent growth spurt or PHV itself (the peak growth rate after which growth decelerates), and the onset of menarche. Sensitive periods for stamina, strength and skills are identified using maturational markers as well. The trainability of speed and suppleness are based on chronological age (all available research is based on chronological age).

**Figure 9: Variation in Trainabilty** (Adapted from work by Bouchard et al., 1997)

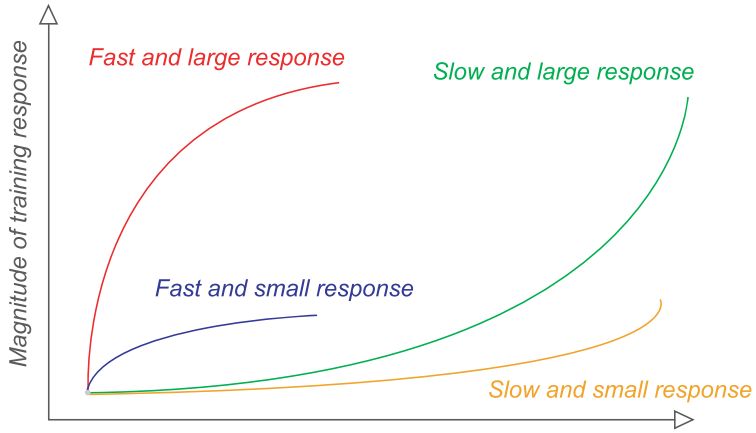


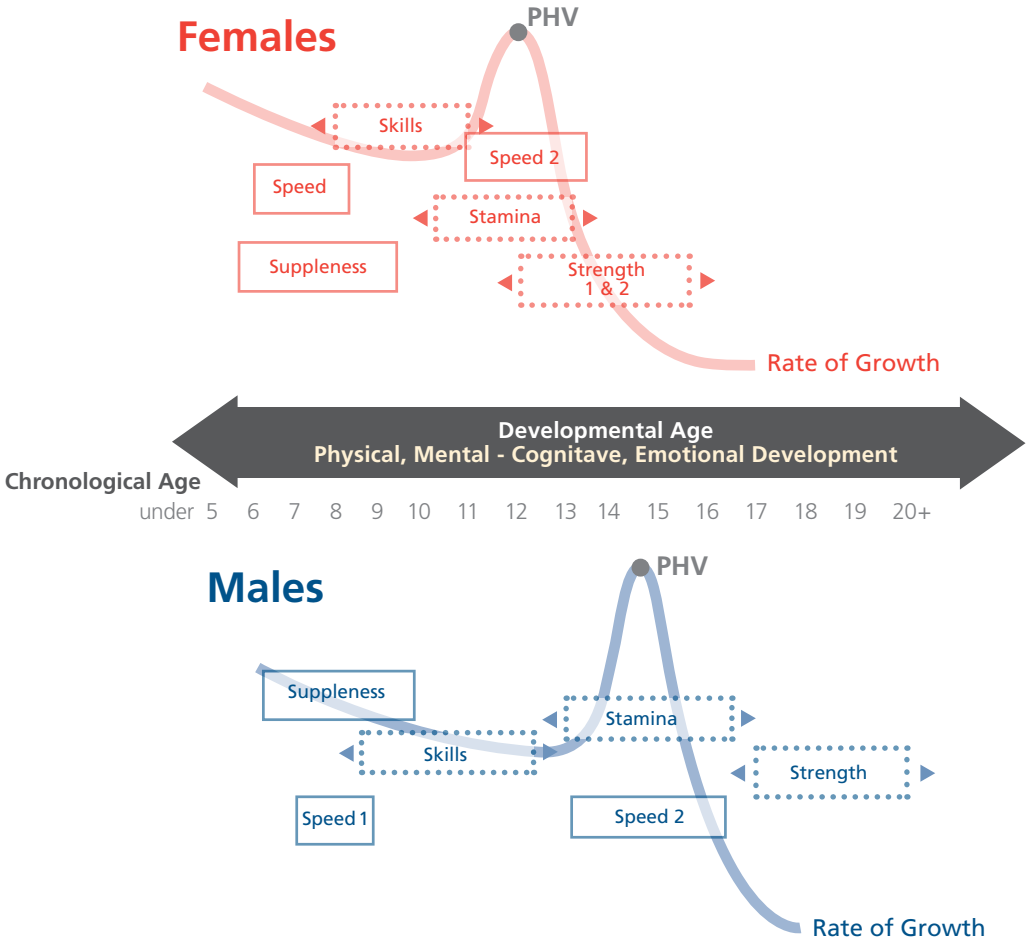

**Figure 9** illustrates the evidence to date that supports the high degree of variation in the trainability of humans (athletes), both from the standpoint of the magnitude of change and the time course of response to a given stimulus. This probably reflects the elasticity of response to various stimuli and human diversity (as largely dictated by the underlying genetic matrix and supported by the environment in which an individual is immersed). *(Norris and Smith, 2002)*

# All systems are always trainable!

**Figure 10** illustrates the sensitive periods for females and males. Three sensitive periods – skills, stamina and strength – are based on the moving scales of the onset of the growth spurt and PHV. The other two sensitive periods – speed and suppleness – are based on chronological age, due to the fact that all research on speed and suppleness has been based on chronological age. The trainability of the different systems for children and youth with a disability is not well understood. Applying this information to specific athletes with a disability is a good example of coaching being an art as well as a science.

The concept of trainability has sparked considerable discussion within sport and academic communities. Trainability is well documented in coaching and research literature, including *Arbeit (paper presented at European Athletics Coaches Association Conference, 1997), Borms (1986), Kobayashi et al. (1978), Malina, Bouchard and Bar-Or (2004), Rowland (2005), Rushall (1998), Viru (1995), and Viru et al. (1998; 1999).* This body of work provides reasonable evidence to support the concept of accelerated adaption to training or windows of trainability, taking into account the importance – and inherent limitations – of applied field research for practical results.

**Figure 10: The Sensitive Periods of Accelerated Adaptation to Training** (Balyi and Way, 2005)




During the sensitive periods the windows of trainability are fully open. Outside of the sensitive periods the windows are still open, though only partially.

All research done on speed and flexibility is based on chronological age. The solid lines represent that research. The dotted lines represent the sensitive periods of accelerated adaptation to training based on developmental age. The dotted lines are defined by the onset of the growth spurt. The fastest rate of growth, or PHV, occurs after growth decelerates.

# The Ten S's of Training and Performance

The five basic S`s of Training and Performance *(Dick, 2007).*

1. **Stamina (Endurance)**
2. **Strength**
3. **Speed**
4. **Skill**
5. **Suppleness (Flexibility)**


**1. Stamina**

**2. Strength**

**3. Speed**

**4. Skill**

## 1. Stamina (Endurance)

The sensitive period for stamina occurs at the onset of the adolescent growth spurt. Aerobic capacity training is recommended before athletes reach PHV. Aerobic power should be introduced progressively after PHV when growth rate decelerates.

## 2. Strength

The sensitive period for strength in girls is immediately after PHV or at the onset of menarche, while for boys it is 12 to 18 months after PHV.

## 3. Speed

For boys, the first sensitive period for speed occurs between the ages of 7 and 9 years, and the second occurs between the ages of 13 and 16. For girls, the first sensitive period for speed occurs between the ages of 6 and 8 years, and the second occurs between the ages of 11 and 13.

## 4. Skill

The sensitive period for optimal skill training generally takes place between the ages of 9 and 12 years for boys and between the ages of 8 and 11 for girls, or more precisely before the onset of adolescent growth spurt (the "skill hungry" years).

## 5. Suppleness (Flexibility)

The sensitive period for suppleness for both genders occurs between the ages of 6 and 10. Although flexibility training during puberty yields good results, special attention should be paid to flexibility during the adolescent growth spurt, due to stresses on muscles, ligaments and tendons by the rapidly growing bones.

An additional five S`s have been identified as important to building a complete and holistic plan for developing athletes. These include the following considerations:

6. **Structure/Stature**
7. **Schooling**
8. **(p)Sychology**
9. **Sustenance**
10. **Socio-Cultural**

Stress should be monitored carefully to ensure that overstress does not occur. (Overstress can occur from the cumulative effects of everyday stresses of life, such as schooling, exams, peer groups, family and romantic relationships, as well as increased training volume and intensities, or competition.) Of particular concern is stress caused by conflicting demands made on athletes from club, school and representative teams. Communication between all coaches involved in the athlete's training and competition programs is essential.

**5. Suppleness**

**6. Structure/Stature**

**7. Schooling**

**8. (p)Sychology**

## 6. Structure/Stature

Stature is the height of a human. In terms of training and performance, it refers to the process where the instructor, coach, teacher or parent records regular measurements before, during and after maturation. The purpose is to track growth and identify the onset of the adolescent growth spurt, PHV and whether athletes are early, average or late maturing. The tracking of stature as a guide to developmental age allows for planning to address the sensitive periods *(Viru, 1995; Viru et al., 1998; Viru et al., 1999)* of physical development (endurance, strength, speed and flexibility) and skill development. Measurements should be done every three months, measuring standing height, sitting height and arm span.

*(For further information see **The Role of Monitoring Growth in Long-Term Athlete Development** – CS4L Resources p. 74).*

## 7. Schooling

In designing an effective training program, the demands of school must be considered. These include integrating school academic loads and duties, school related stresses, and the timing of exams. When possible, training camps and competition tours should complement, not conflict, with the timing of major schools academic events.

## 8. (p)Sychology – Mental Fitness

Mental fitness concepts and strategies can be introduced to athletes at an early age. Initially, this involves instilling foundational principles of positive attitude, positive focus and imagination, while emphasizing effort and fun. As athletes progress through the seven stages of LTAD, mental skills and strategies are introduced and developed to help athletes handle the increasing pressures and demands of competitive sport. The acquisition of mental fitness is a dynamic process that fluctuates depending on

- the time and effort put towards developing the mental skills and attributes, and
- the athletes' openness to self-learning and reflecting on competitive experiences.

In order to provide athletes with the opportunity to reach their personal performance potential, it is imperative that mental fitness be incorporated throughout their long-term development.

*(For further information see **Mental Fitness for Long-Term Athlete Development** – CS4L Resources p. 75).*

## 9. Sustenance

Training, participation in sport and physical activity and competition can lead to significant levels of fatigue in athletes. Recovery is the process whereby the body rids itself of fatigue. At the same time, the body adapts to the training stimulus and regains the capacity to produce the strength, endurance and power required for other physical activity, training or competition.

## 10. Socio-Cultural

The socio-cultural aspects of sport are significant and must be managed with proper planning. Socialization via sport will ensure that general societal values and norms are internalized through sport participation. This occurs at the community level and as an athlete progresses through the LTAD stages, leads to international exposure.


**9. Sustenance**

**10. Socio-cultural**

A variety of methods and modalities can be used to facilitate the recovery process and help the athlete to regain his or her capability to sustain the repeated demands of training, participation or competition. These include nutrition, hydration, rest, sleep and the use of techniques such as massages, contrast baths, ice baths and warm water jets. The need and use of specific recovery strategies, as well as the frequency at which they should be employed, will vary according to the stage of LTAD and the athlete's level of competition.

Optimal management of the recovery process also requires careful attention be given to the other life activities of the athlete outside of sport. They can also be fairly demanding and represent significant sources of both fatigue and stress.

Poor planning, excessive training and participation in too many competitions can all induce severe levels of fatigue. The same detrimental outcome can come from the improper management of the athlete's recovery process.

*(For further information see **Recovery and Regeneration for Long-Term Athlete Development** – CS4L Resources p. 76).*

Exposure to various cultures provides broadening of perspectives, including ethnicity awareness and national diversity. Within the travel schedule, recovery can include education related to the competition location, including history, geography, architecture, cuisine, literature, music and visual arts. With proper planning, sport can offer much more than simply commuting between hotel room and competition.

**Sport socialization** refers to the sport subculture in a particular sport. Sport subcultures are very diverse; just consider the differences between rugby, gymnastics, soccer or swimming subcultures. Within each sport subculture, it is important that coaches and parents guard against group dynamics that create a culture of abuse or bullying. Ethics training should be integrated into training and competition plans at all stages of LTAD.

Overall socio-cultural activity is not a negative distraction or an interference with training or competition activities. It is a positive contribution to development of the participant as a person.

5

# Mental, Cognitive and Emotional Development

Mental, cognitive and emotional factors are essential to each athlete's development. Not only is holistic development – which encompasses all of these factors, in addition to physical development – beneficial to the individual, but all of these skill sets are interlinked.

Just as physical and technical skills require long-term and sequential development, so too do the psychological aspects of athlete development. This includes a range of knowledge sets, such as the underpinnings of fair play and ethical sport, mental skills for performance, emotional regulation, sequencing and decision-making.

Programming should be designed to deliver all aspects of athlete development in a complementary manner, including mental, cognitive and emotional components.

Training, competition and recovery programs should consider the cognitive, moral and emotional development of each athlete. This is not simple, since there are no easily visible markers for the transitions between stages of cognitive, moral and emotional development. Figure 11 outlines how Piaget's *(1954)* stages of intellectual development, and Erikson's *(1959, 1964)* stages of emotional development match up with the first five stages of LTAD.

**Intellectual development:** children go through both the sensorimotor and pre-operational stages during Active Start. During the first couple of years, children explore the world around them through movement and sensory experience. They begin to understand that objects are permanent by the end of their first year, and by age two they are generally able to plan and execute movements to get what they want, such as moving an object to get an object behind it. Between ages two and seven, children begin to grasp language and develop the ability to talk about things that are not present, though they still maintain a self-centred point of view. Role playing and symbolism, such as a blanket draped over a chair representing a fort, become important at this stage.

The concrete operational stage covers the next three LTAD stages. Moving from FUNdamentals through Learn to Train and into Train to Train, individuals continue to develop logic. They begin to understand how the world operates, though abstractions – game plans or team strategy – can still be difficult to grasp until the early stages of Learn to Train. Comprehension of "reversibility" and the consequences of some actions (i.e. kicking a basketball is a foul, and five fouls means dismissal from the game) comes into play during Learn to Train as well.

The formal operational stage takes place during the Train to Train and Train to Compete stages and remains the dominant stage for the remainder of life. The ability to think about abstractions becomes prevalent. Logical thought and deductive reasoning emerge, and systematic, long-term planning becomes part of the individual's thought process. Individuals fully understand the rules of the game and the consequences of their actions.

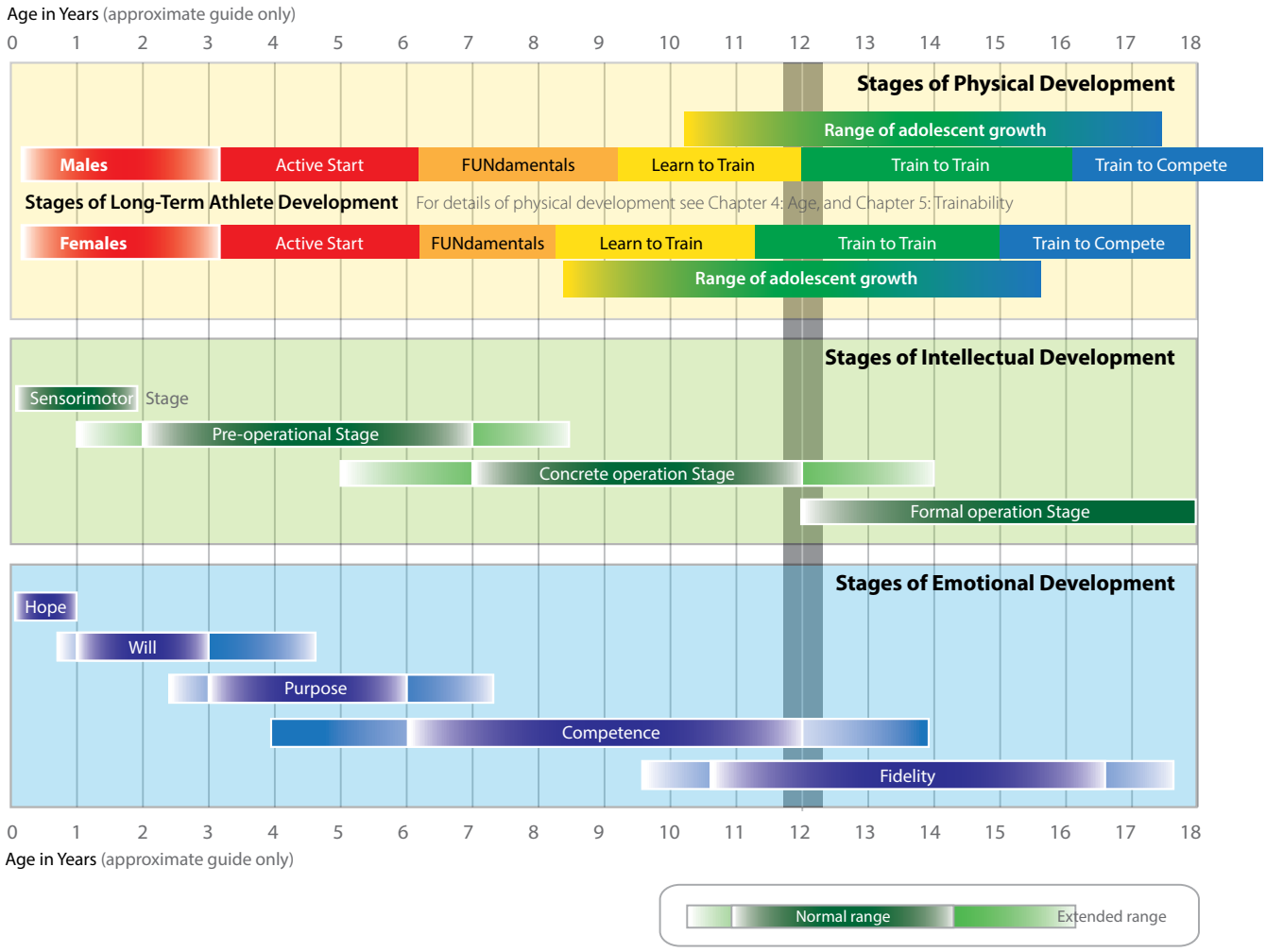
**Emotional development:** Individuals go through eight stages of emotional development (so long as they're cared for and raised well), though the first five are most important to coaches or parents engaged in LTAD. Hope, Will and Purpose are all covered by Active Start. Hope is the first year of life when children begin trusting adults. Will is where children learn to explore and begin to develop autonomy, lasting until age three. Between ages four and six – Purpose – children will develop initiative through learning to plan and doing things on their own.

**LTAD is about building the entire person, not just the athlete.**

Competence spans Active Start to Train to Train. This is where children begin judging and comparing their and others' behaviour. They recognize differences in abilities and if they judge themselves to be inferior to others, they may withdraw from participation. Fidelity ranges from the end of Learn to Train through Train to Compete and encompasses the self-reflection period of one's youth. It's important for children to explore their own world and thoughts without pressure from parents or coaches to be a certain role, which can lead to confusion.

A major objective of LTAD is a holistic approach to athlete development. This includes emphasis on ethics, fair play and character building throughout the various stages, an objective that reflects Canadian values. Programming should be designed considering athletes' cognitive ability to address these concepts.

**Figure 11: The Relationships Among LTAD Stages and Stages of Cognitive, Emotional and Moral Development**
(Adapted from work by Piaget, 1954; Erikson, 1959, 1964; Balyi, Way and Higgs, 2013)



# 6

# Periodization

Simply put, periodization is time management. As a planning technique, it provides the framework for arranging the complex array of training processes into a logical and scientifically-based schedule to bring about optimal improvements in performance.

Periodization sequences the training components into weeks, days and sessions. Periodization is situation-specific, depending upon priorities and the time available to bring about the required training and competition improvement. In the LTAD context, periodization connects the stage the athlete is in to the requirements of that stage.

The terminology that describes the smaller subsets of time (organized blocks of training or competition) is meso and micro cycles. Meso cycles are usually three to four weeks, while micro cycles are, by convention, usually just seven days.

Periodization organizes and manipulates the aspects of modality, volume, intensity and frequency of training through long-term (multi-year) and short-term (annual) training, competition and recovery programs to achieve peak performances when required.

Single, double, triple and multiple periodization formats follow the same principles with frequently introduced preventative breaks; that is, programmed and prioritized recovery and regeneration elements. Figure 12 illustrates a single periodized annual plan for summer and winter sports.

Periodization, far from being a single fixed process or methodology, is in fact a highly flexible tool. When used appropriately in conjunction with sound methodology and ongoing monitoring and evaluation, it is an essential component in optimal sports programming and athlete development at all levels.

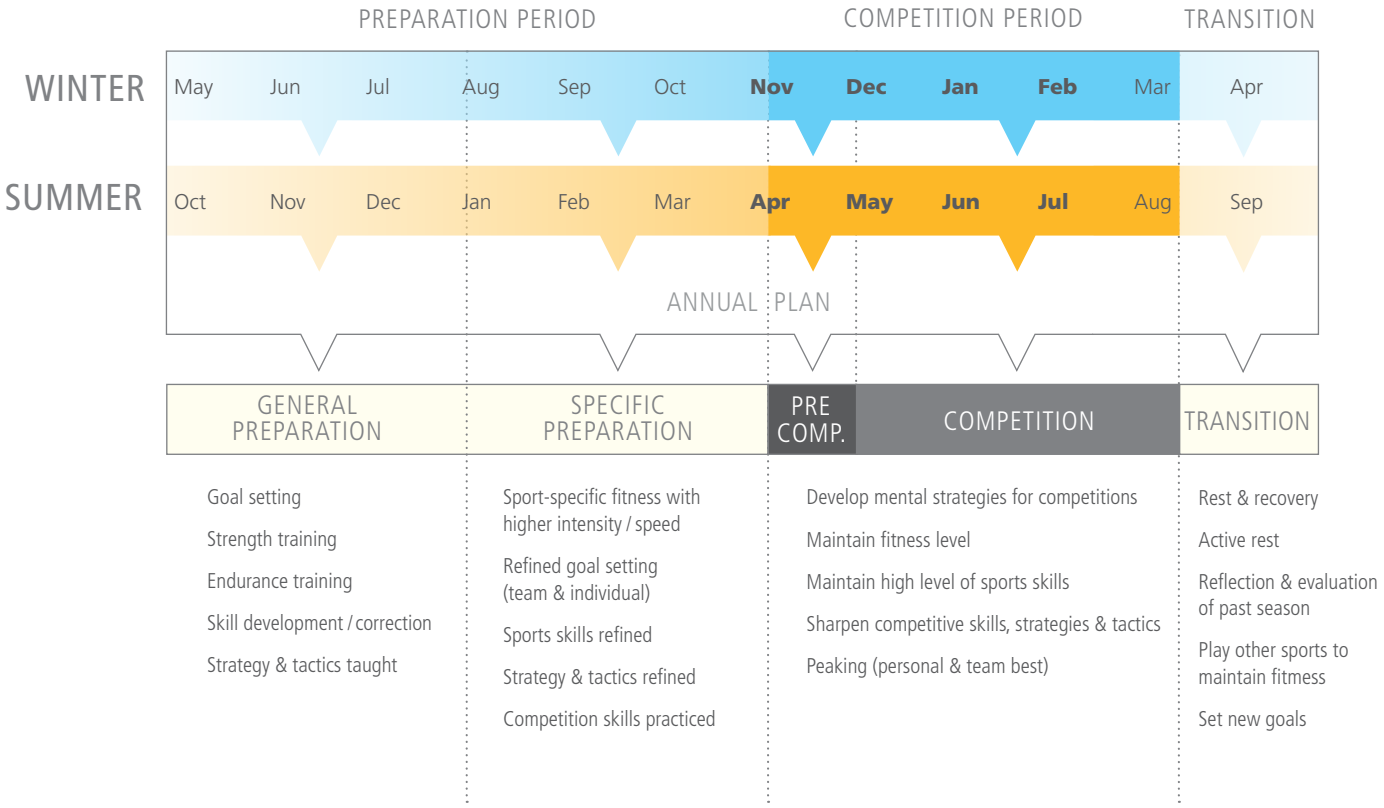
LTAD addresses this requirement by developing periodization models for all stages, taking into consideration the growth, maturation and trainability principles that are unique to the primary development stages — the first two decades of life — yet seamlessly integrate with the subsequent stages of athletic performance and life.

LTAD is typically a 10- to 12-year process that optimizes physical, technical, tactical (including decision making) and mental preparation, as well as the supporting ancillary capacities. Within LTAD is quadrennial planning; this refers to the four-year Olympic and Paralympic cycle for elite athletes, and the annual plan, which is based upon identified periods of athletic preparation, competition and the transition into the next calendar plan.

Current examples of periodization models identified in the sport performance literature are designed for the sub-elite and elite senior/mature performers. There is very little information on periodization for children or adolescents or for athletes with a disability.

The following two charts diagrammatically illustrate a sample annual plan for summer and winter sports respectively. While the same principles apply at each stage, their application will be different at Learn to Train, Train to Train, Train to Compete and Train to Win.

**Figure 12: Periods and Phases of a Winter and Summer Periodized Annual Plan** (Balyi, Way and Higgs, 2013)



# 6

**Table 2: Phases of an Annual Plan for Single, Double and Triple Periodization**

| Five Phases of a Single Periodized Annual Plan | Eight Phases of a Double Periodized Annual Plan | Eleven Phases of a Triple Periodized Annual Plan |
|---|---|---|
| General Preparation Phase (GPP) | General Preparation Phase (GPP) | General Preparation Phase (GPP) |
| Specific Preparation Phase (SPP) | Specific Preparation Phase (SPP) 1 | Specific Preparation Phase (SPP) 1 |
| Pre-Competition Phase (PCP) | Pre-Competition Phase (PCP) 1 | Pre-Competition Phase (PCP) 1 |
| Competition Phase Peak (CP) | Competition Phase (CP) 1 Peak One | Competition Phase (CP) 1 Peak One |
| Transition Phase (TP) | Specific Preparation Phase (SPP) 2 | Specific Preparation Phase (SPP) 2 |
| | Pre-Competition Phase (PCP) 2 | Pre-Competition Phase (PCP) 2 |
| | Competition Phase (CP) 2 Peak Two | Competition Phase (CP) 2 Peak Two |
| | Transition Phase (TP) | Specific Preparation Phase (SPP) 3 |
| | | Pre-Competition Phase (PCP) 3 |
| | | Competition Phase (CP) 3 Peak Three |
| | | Transition Phase (TP) |


7

# Competition

Optimal competition calendar planning at all stages is critical to athlete development. At certain stages, developing the physical capacities take precedence over competition. At later stages, the ability to compete well becomes the focus.

**Table 3** outlines general recommendations for the ratio of training to competition and competition-specific training. Consider how the quantity and quality of the training and competition program changes as long-term plans progress.

**Table 3: Training to Competition Ratios**

| Stages | Recommended Ratio |
|---|---|
| **Active Start** | No specific ratios – all activity based on developing physical literacy and child's passion to play and participate |
| **FUNdamentals** | All activities FUN-based including some structured competition |
| **Learn to Train** | 70% training to 30% competition-specific training and actual competition |
| **Train to Train** | 60% training to 40% competition-specific training and actual competition |
| **Train to Compete** | 40% training to 60% competition-specific training and actual competition |
| **Train to Win** | 25% training to 75% competition-specific training and actual competition |
| **Active for Life** | Based on the individual's desire |

Key points to consider:

- Optimal sport-specific competition ratios are required for all stages of LTAD.
- Level and length of the competitive season should be aligned with the changing needs of the developmental athlete progressing through LTAD.
- Over-competition and under-training at the Learn to Train and Train to Train stages result in a lack of basic skills and fitness.
- The appropriate level of competition is critical to technical, tactical and mental development at all stages.
- Schedules are often set for team sports by leagues and organizations and not by the coach and athlete, making optimal training based on periodization difficult. For individual sports, individual competition schedules can be selected by the coach and athlete based on the athlete's developmental needs.

- The current competition structure is based on tradition. It should be planned to enhance optimal training and performance of the athlete depending upon their LTAD stage.
- Competitions in Canada must be created and scheduled strategically, with due regard for the optimal performance of an athlete and their tapering and peaking requirements.
- Optimal training-to-competition ratios for individual sports vary greatly and must be determined on a sport-specific basis.
- While international and national calendars are usually well integrated, a systematic sport-specific competition review needs to be undertaken. This is one of the biggest challenges for team sports and a significant challenge for individual sports in LTAD design and implementation.

8

# Excellence Takes Time

It has been suggested that a minimum of 10 years of practice (sometimes stated as 10,000 hours) is needed for expert performers in any field to reach the elite level (Ericsson, Charness, Feltovich, & Hoffman, 2006). Other evidence indicates that elite athletes require at least 11 to 13 years of practice to reach levels of excellence (Gibbons, Hill, McConnell, Forster & Moore, 2002). The essential lesson is the same: there are no shortcuts to achieving excellence.

Participant development is a long-term process and elite participants will require approximately a decade or more of practice to achieve international standing. As part of this process, short-term performance goals must never be allowed to undermine long-term athlete development *(Viru, 1995)*.

For some sports, the road to excellence is not paved in hours, but through deliberate practice repetitions. Shooting or archery would be measured in number of shots an athlete has taken; golf would be measured in number of swings; in parachuting, an athlete's excellence is related to the number of jumps.


The United States Olympic Committee's The Path to Excellence study *(Gibbons et al., 2002)* provides empirical evidence and a comprehensive view of the development of U.S. Olympians who competed between 1984 and 1998. The results reveal that:

- U.S. Olympians begin their sport participation at the average age of 12.0 for males and 11.5 for females.
- Most U.S. Olympians reported an 11- to 13-year period of talent development from the time they began their sport to when they made an Olympic team.
- U.S. Olympic medalists were younger than non-medalists by 1.3 to 3.6 years during the first five stages of development, suggesting that medalists were receiving motor skill development and training during the skill hungry years.

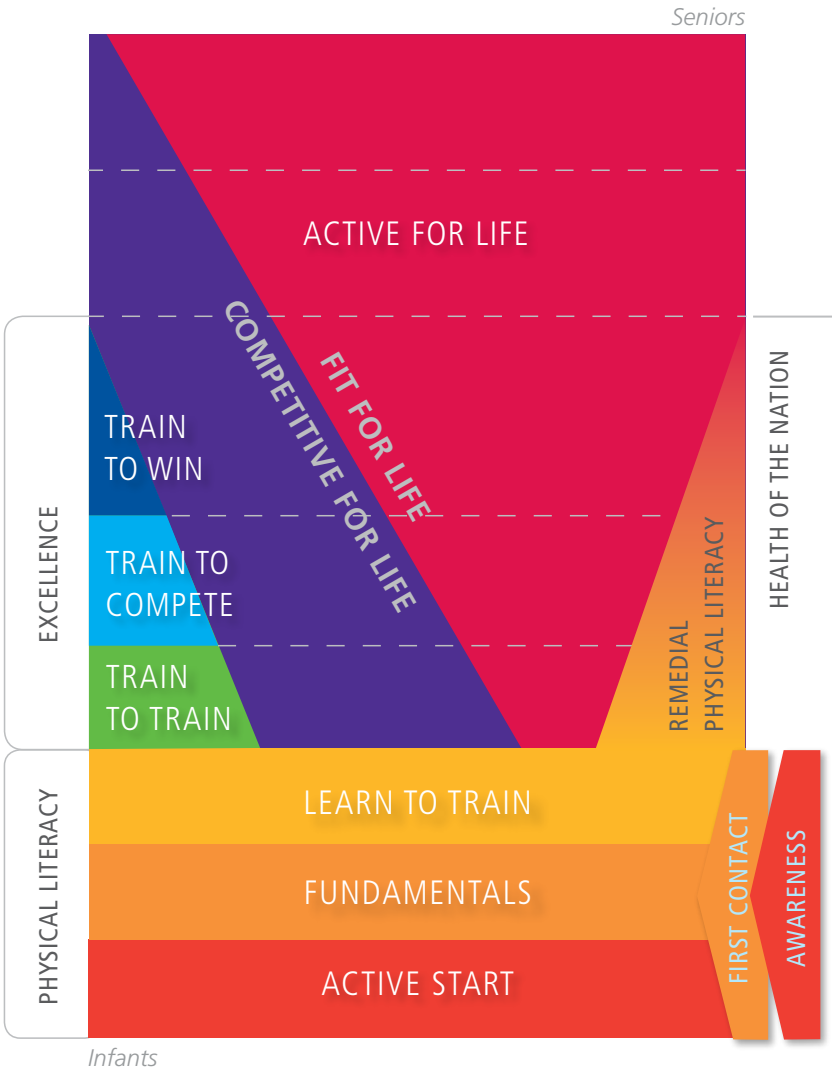
Lately, the validity of the 10,000 hours has been questioned. It has been suggested that when athletes specialize in certain sports, they can achieve excellence in a much shorter period *(Tucker, 2012)*. However, the three or four other sports the athletes participated in before they specialized has usually not been taken into account. LTAD emphasizes a multi-sport approach: all former activities should be included as they are an integral part of the 10,000 hours. Whether it is 10,000 hours, more, or less, excellence always takes time.

# 9

# System Alignment and Integration

**Figure 13** illustrates the various performance priorities that CS4L – LTAD addresses and the system development it effects. The following points should act as recommendations of how to align and integrate a system so that the organizations within the system are structured in the optimal form.

**Figure 13: System Alignment and Integration Within Canadian Sport for Life**




SYSTEM DEVELOPMENT

- Clubs
- Community Initiatives
- Communications
- Facility Plans
- Financial Sustainability
- Governance
- Games:
  - International
  - National
  - Provincial
- Event Hosting
- Human Resources
- Marketing
- Organizational
- School Sport Academies and Other Initiatives
- Risk Management
- Sport Sector
- Technology
- Volunteers

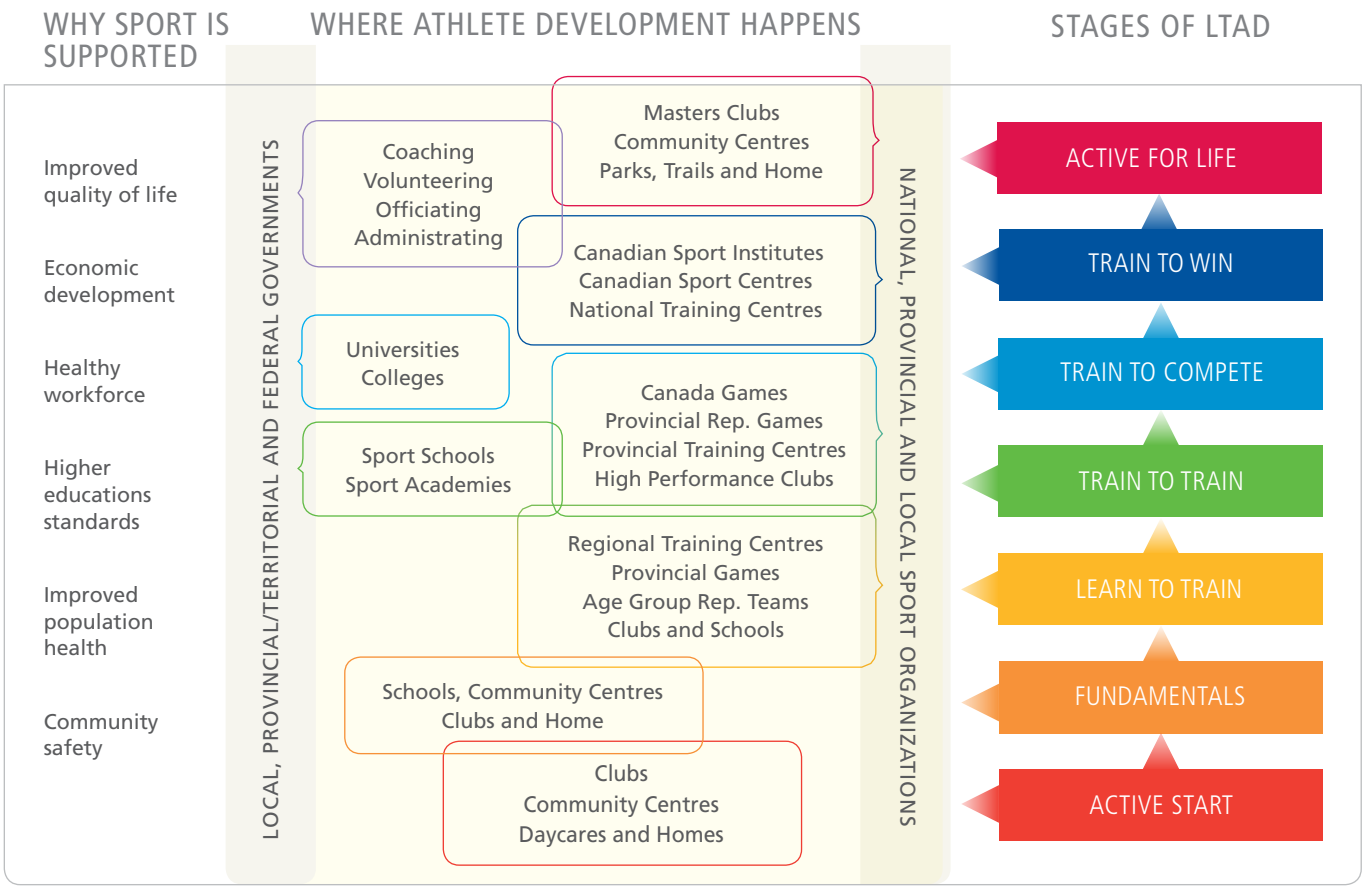
PERFORMANCE PRIORITIES

- Athlete Performance and Support
- Coach Education and Support
- Competition
- Equipment
- Facility Access
- Sport Medicine
- Sport Science
- Talent ID - Scouting
- Teams:
  - National
  - Provincial
  - Club
- Training
- Research

- CS4L – LTAD is the core business of national, provincial/territorial and local sport organizations.
- CS4L – LTAD is a tool for change towards full system alignment and integration.
- A seamless, sport-specific LTAD should be based on national and international normative data, both sport-specific and sport science.
- LTAD plans for athletes with a disability need to be developed on a sport-by-sport basis taking into account the specific needs of individuals with a congenital or acquired disability.
- After a sport's LTAD design is completed, a sport-specific system of competition should be established that matches the competitive needs of developmental athletes during the Active Start, FUNdamentals, Learn to Train and Train to Train stages.
- LTAD is an athlete-centered approach designed around the needs of athletes and institutionalized by rationalization of the system by sport governing bodies.
- The process of designing and implementing LTAD programs is athlete centered, coach driven and administration, sport science and sponsor supported.
- LTAD has a strong impact on the coaching education curriculum. Developmental readiness will replace ad hoc decision-making about programming preparation.
- Activities of schools, communities, clubs, PSOs and NSOs should be fully aligned with and integrated through CS4L – LTAD.

**Figure 14** illustrates the relationship between national and local agencies and programs. Now that CS4L – LTAD is supported and promoted by all levels of government including Canadian Heritage (Sport Canada) and the provincial/territorial ministries responsible for sport and recreation; provincial/territorial health ministries and Health Canada; provincial/territorial education ministries; other relevant federal and provincial/territorial departments and ministries; and municipal governments, it can be used as a tool to implement the Canadian Sport Policy 2012.

**Figure 14: Strategic Leadership for Sport** (Sport England, 2004 – Modified and adapted by Higgs & Way, 2013)



10

# Continuous Improvement – Kaizen

The LTAD framework is based on the principle of continuous improvement, both in its dynamic evolution and in its application. The concept of continuous improvement is drawn from the respected Japanese industrial philosophy known as Kaizen.

LTAD is a dynamic framework that utilizes continuous adjustments based on key principles. Continuous improvement ensures that:

- CS4L – LTAD responds to and incorporates scientific, coaching and sport-specific innovations and observations and is subject to continuous research in all its aspects.
- CS4L – LTAD, as a continuously evolving vehicle for change, reflects all emerging facets of physical education, sport and recreation to ensure systematic and logical delivery of programs to all ages.
- CS4L – LTAD promotes ongoing education and sensitization of all stakeholders in the fields of sport, recreation, physical activity and education about the interlocking relationship between physical education, school sport, community recreation, lifelong physical activity and high performance sport.
- CS4L – LTAD promotes integration between sectors based on common principles and shared goals.

Consequently, all partners are invited to contribute to the ongoing evolution and development of CS4L – LTAD, for the benefit of all Canadians.

# Stages of Long-Term Athlete Development

LTAD is a multi-stage training, competition and recovery pathway that guides an individual's experience in sport and physical activity. The stages in the LTAD pathway provide developmentally appropriate programs for all ages with the aim of increasing participation and optimizing performance.

These stages are general in nature and are adjusted on a sport-specific basis. As of 2013, all sports funded by Sport Canada have completed their sport-specific Framework, based on the original seven-stage LTAD framework, that take into account the timing of specialization, amongst many other considerations.

# Active Start

Chronological Age
Males and Females 0 - 6

## Objectives:

Learn fundamental movements and link them together in play.

Physical activity is essential for healthy child development. Among its other benefits, physical activity:

1. Enhances development of brain function, coordination, social skills, gross motor skills, emotional development, leadership and imagination.
2. Helps children build confidence and positive self-esteem.
3. Helps build strong bones and muscles, improves flexibility, develops good posture and balance, improves fitness, reduces stress and improves sleep.
4. Promotes healthy weight.
5. Helps children learn to move skillfully and enjoy being active.

Physical activity should be fun and a part of the child's life every day. Active play is the way young children are physically active.

The healthy development of children with a disability requires participation in organized physical activity and active play. In order for disabled children to enjoy sport and stay active for life, communities need to find effective methods to provide equipment. Childhood is a period of rapid growth, making sport difficult when disabled children continually outgrow their mobility aids. Equipment swaps and rentals are a good alternative.

The following considerations are true for the mental, cognitive and emotional development of individuals in Active Start:

- **Mental and cognitive** – This is a stage of critical brain development. Active play is key at this stage as it builds important connections in the brain, and between the brain and children's muscles. Repetition of rhythmic activity allows brain-muscle connections to be strengthened. At this stage children begin using their imagination, as well as developing understanding, memorization and movement presentation.
- **Emotional** – Children can experience pleasure at this stage from being involved in activities that offer rhythms of various stimuli. It is important to pay attention to the child, as this attention can help with encouragement and the development of the child's self-efficacy. Children pick up on and imitate adult's attitudes — if adults have fun and enjoy physical activity, it increases the chance that the child will as well. By performing activities that adults are unable to do, children gain a great sense of achievement.

# Active Start Checklist:

- ☐ Provide organized physical activity for at least 30 minutes a day for toddlers and at least 60 minutes a day for preschoolers.
- ☐ Provide unstructured physical activity — active play — for at least 60 minutes a day, and up to several hours per day for toddlers and preschoolers. Toddlers and preschoolers should not be sedentary for more than 60 minutes at a time, except while sleeping.
- ☐ Provide physical activity every day regardless of the weather.
- ☐ Starting in their infancy, provide infants, toddlers and preschoolers with opportunities to participate in daily physical activity that promotes fitness and movement skills.
- ☐ Provide parents and care givers with age-appropriate information.
- ☐ Ensure that children acquire movement skills that build towards more complex movements. These skills help lay the foundation for lifelong physical activity.
- ☐ Encourage basic movement skills — they do not just happen as a child grows older, but develop depending on each child's heredity, activity experiences and environment. For children with a disability, access to age and disability-appropriate adapted equipment is an important contributor to success.
- ☐ Focus on improving basic movement skills such as running, jumping, twisting, kicking, throwing and catching. These basic human movements are the building blocks for more complex activities.
- ☐ Design activities that help children feel competent and comfortable participating in a variety of fun and challenging games and activities.
- ☐ Ensure that games for young children are non-competitive and focus on participation.
- ☐ Because girls tend to be less active than boys and children with a disability less active than their peers, ensure that activities are gender-neutral and inclusive so that active living is equally valued and promoted for all children.

At this stage, optimal development occurs when adults provide a safe place for children to play, and when there is unstructured access to a wide variety of colourful toys and equipment.

Movement is the first language of the child.

# FUNdamentals

Chronological Age
Males 6-9 and Females 6-8

## Objectives:

Learn all fundamental movement skills and build overall movement skills.

Skill development in the FUNdamentals stage should be well structured, positive and FUN!

No periodization takes place; however, all programs are structured and monitored.

If children later decide to leave the competitive stream, the skills they acquire during the FUNdamentals stage will benefit them when they engage in recreational activities, enhancing their quality of life and health.

The following should be considered when working on the mental, cognitive and emotional development of children in FUNdamentals:

- **Mental and cognitive** – Because the attention span is short and memory is developing progressively, children in this phase have limited reasoning ability. Therefore, children are action-oriented and enjoy the repetition of activities. They improve their abilities through experience. However, there is a growing capacity for more abstract thought later on in this phase, which helps the imagination to blossom.
- **Emotional** – Children like to be the centre of attention during this phase and their self-concept is developing through experience and comments from others. The influence of peers becomes a strong driving force behind all activities. This is a time when children begin to understand the need for rules and structure.

# FUNdamentals Checklist:

- ☐ Practice to become proficient in fundamental movement skills before more sport-specific skills are introduced towards the end of the stage.
- ☐ Emphasize the overall development of the child's physical capacities, fundamental movement skills and the ABCs of athleticism: agility, balance, coordination and speed.
- ☐ Teach appropriate and correct running, jumping and throwing techniques.
- ☐ Emphasize the development of fundamental movement skills to produce individuals who have a better skill base for potential long-term sport-specific development.
- ☐ Introduce basic flexibility exercises.
- ☐ Develop speed, power and endurance using games.
- ☐ Encourage participation in a wide range of sports.
- ☐ Develop linear, lateral and multi-directional speed with short bursts of activity (less than five seconds), allowing for full recovery between repetitions.
- ☐ Include strength training exercises using the child's own body weight as well as medicine ball and Swiss ball exercises.
- ☐ Ensure that sporting and disability equipment are size, weight and design appropriate and that communities explore ways to share and provide access to appropriate equipment. Safety equipment must fit well.
- ☐ Introduce children to the simple rules and ethics of sports.
- ☐ Introduce very simple mental skills.
- ☐ Ensure that activities change during the school year and are enhanced by multi-sport camps during summer and winter holidays.
- ☐ Participate once or twice a week in a preferred sport, so long as there is participation in many other sports or activities three or four times per week.

If during this stage children are failing to develop fundamental movement skills, then remediation is desirable.

If children do not have the same activity skills as their peers they are unlikely to be included in peer-group activities and will have fewer opportunities for practice.

# Learn to Train

Chronological / Developmental Age
Males 9-12 and Females 8-11

## Objectives:

Learn overall sports skills.

One of the most important periods of sports skills development for children is between the ages of 9 and 12, before the onset of the adolescent growth spurt. This stage is a sensitive period of accelerated adaptation to skill learning.

Early specialization in late specialization sports can be detrimental to later stages of skill development.

At this stage, children are developmentally ready to acquire the general sports skills that are the cornerstones of all athletic development.

Introduce recovery and regeneration techniques.

Introduce the concept of ancillary capacities, the knowledge base of an athlete related to warm-up, cool-down, stretching, nutrition/hydration and mental preparation.

Physical literacy is one of the key objectives at this stage. For more information, see page 54.

The following considerations are true for the mental, cognitive and emotional development of individuals in the Learn to Train stage:

- **Mental and cognitive** – Children gain a greater understanding of how the world works, and are developmentally ready to acquire the general sports skills that make up the cornerstones of all athletic development. They can comprehend direct instructions, but likely will have trouble perceiving abstract statements.
- **Emotional** – Children are developing their self-concept and feel secure with routine and structure to training. They also begin judging their behaviour and the behaviour of others. Because children are able to recognize differences in abilities, thus, comparing their self-worth to their assessment of others, there's the risk that if they judge themselves to be inferior to others, they may withdraw from participation. It's important to help children develop a similar skill level as that of their peers.

# Learn to Train Checklist:

- ☐ Further develop all fundamental movement skills and teach general, fundamental sports skills. Otherwise, a significant window of opportunity is lost, compromising the ability of the young player/athlete to reach their full potential.
- ☐ Develop strength using exercises that incorporate the child's own body weight as well as Medicine balls and Swiss balls.
- ☐ Introduce hopping and bounding exercises or routines to aid in strength and power development.
- ☐ Further develop endurance through continuous activity games and relays.
- ☐ Further develop flexibility through stretching.
- ☐ Further develop speed by using specific activities that focus on agility, quickness and change of direction during the warm-up.
- ☐ Further develop mental skills including focus and visualization.
- ☐ Provide developmentally appropriate competitions.
- ☐ Identify sports the child enjoys and may have a successful predisposition toward, as enjoyment and success will increase the possibility of the child being active for life. Narrow the focus to three sports.
- ☐ Introduce single periodization noting that some sports need to use double periodization to adequately address the sport's unique needs.
- ☐ Apply a ratio of 70 percent training to 30 percent competition (the 30 percent includes competition-specific training and actual competitions). These percentages vary according to sport and on the individual's specific needs. Athletes undertaking this type of preparation are better prepared for competition in both the short- and long-term than those who focus solely on winning.
- ☐ Encourage unstructured free play.

If, during this stage, children are failing to develop fundamental movement skills, then remediation is desirable.

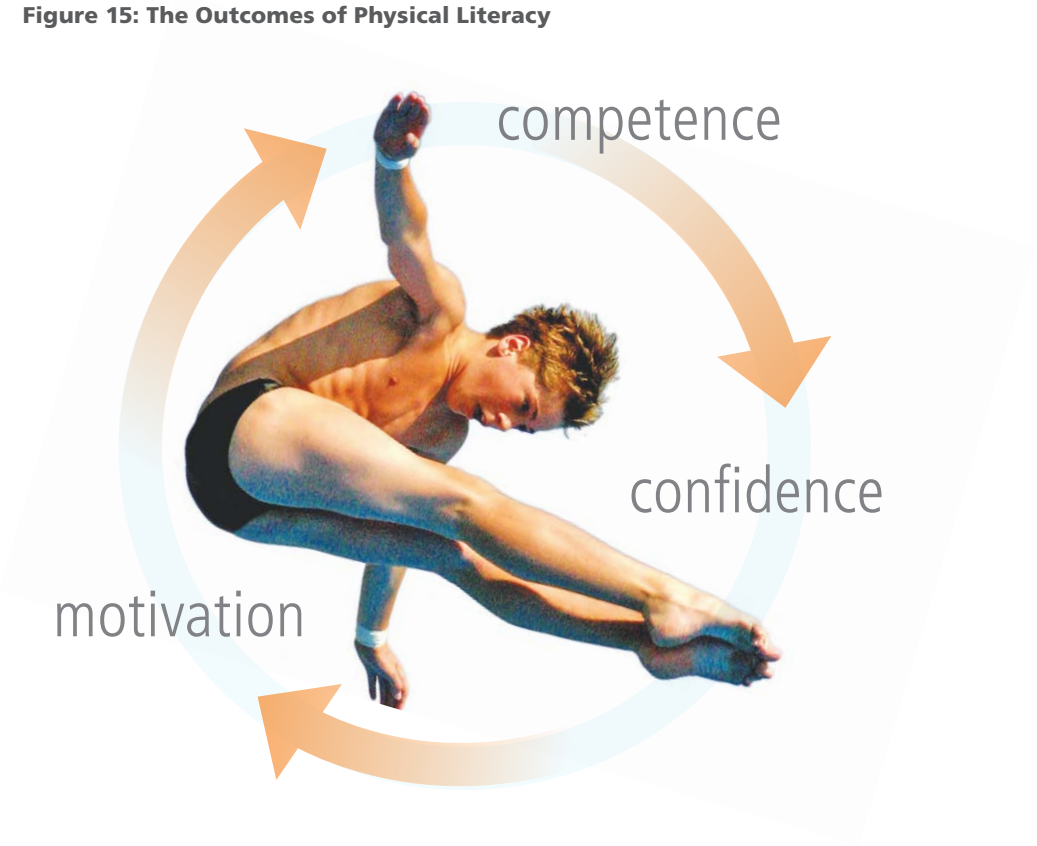
If children do not have the same activity skills as their peers, they are unlikely to be included in peer-group activities and will have fewer opportunities for practice.

The Learn to Train and Train to Train stages are the most important stages of athletic preparation. During these stages, we make or break an athlete!

# Physical Literacy: What Does it Look Like?

People who are physically literate have the competence, confidence and motivation to enjoy a variety of sports and physical activities.

**Figure 15: The Outcomes of Physical Literacy**




Like reading and arithmetic, which develop a literary or numerical vocabulary, physical literacy develops a "movement vocabulary" of fundamental movement skills and fundamental sports skills.

These skills are the basis for moving with competence and confidence in every kind of activity in both indoor and outdoor environments:

- **On the ground**
- **In and on water**
- **On snow and ice**
- **In the air**


Confident and competent on the ground,
in and on water, on snow and ice, and in the air.

# Train to Train

Chronological / Developmental Age
Males 12 - 16 and Females 11 - 15

## Objectives:

Build an aerobic base, develop speed and strength towards the end of the stage, and further develop and consolidate sport-specific skills.


During the Train to Train stage, young athletes consolidate their basic sport-specific skills and tactics and begin to focus more on the one or two sports of their choice. This is a sensitive period of accelerated adaptation to aerobic, speed and strength development.

Optimal aerobic trainability begins with the onset of the growth spurt.

During competitions, athletes play to win and to do their best, but the major focus of training and competition is on applying the skills, strategies and tactics learned in training in competitive situations.

Further develop recovery and regeneration programs.

Develop additional ancillary capacities, including techniques to taper and peak.

The following considerations are true for the mental, cognitive and emotional development of individuals in the Train to Train stage:

- **Mental and cognitive** – Abstract thinking becomes more firmly established, and young participants develop a new form of egocentric thought. Much emphasis is placed on self-identity, with participants eager to perfect their skills. This is also the time when systematic planning emerges. This type of long-term planning is not possible without deductive reasoning, which requires the ability to reach specific conclusions through use of general principles. With regard to sport, this stage is critical to fully understanding the rules of sport and the consequences of one's actions.
- **Emotional** – It is important to note that physical, mental and emotional maturity does not necessarily develop at the same rate. During this phase there is a tremendous influence on behaviour from peer groups and tension generally exists between adults and adolescents. Children require the opportunity to explore their own ideas of self and how they fit in. Pressure from coaches or parents to take on a certain role can cause confusion within the child. Participants are capable of co-operating and accepting some responsibility, and it is important that they are able to display tenderness, admiration and appreciation. At this time there is also a desire to have friends of the opposite sex.

# Train to Train Checklist:

- ☐ Depending on sport-specific needs, make aerobic training a priority after PHV while maintaining or further developing levels of skill, speed, strength and flexibility.
- ☐ Encourage flexibility training, as the rapid growth of bones during this stage leads to stress on tendons, ligaments and muscles.
- ☐ Consider the sensitive periods of accelerated adaptation to strength training for females: immediately after PHV or the onset of menarche. For males, the sensitive period for strength begins 12 to 18 months after PHV.
- ☐ Note that both aerobic and strength trainability are dependent on the maturation levels of the athlete. For this reason, the periods during which aerobic and strength trainability are emphasized depend on whether an athlete is an early, average or late maturer.
- ☐ Learn to cope with the physical and mental challenges of competition and develop further mental skills.
- ☐ Introduce athletes with a disability to specialized sport-specific equipment such as racing wheelchairs and athletic prostheses. For all athletes, the use of body-size and skill-level appropriate equipment remains important.
- ☐ Optimize training and competition ratios and follow a 60:40 percent training-to-competition ratio (the 40 percent includes competition-specific training and actual competitions). Too much competition wastes valuable training time and conversely, not enough inhibits the in-competition practice of technical/tactical and decision-making skills.
- ☐ Encourage athletes to focus on two sports based on their desire to participate and their sport-specific potential.
- ☐ Utilize single and/or double periodization as the optimal framework for preparation.
- ☐ Train athletes in regular competitive situations in the form of practice matches, scrimmages or competitive games and drills.

# Train to Compete

Chronological / Developmental Age
Males 16 - 23 +/- and Females 15 - 21 +/-

## Objectives:

Optimize the engine and learn to compete.

Optimize fitness preparation and sport-, individual- and position-specific skills as well as performance.

All the objectives of the Train to Train stage must be achieved before the objectives of the Train to Compete stage can begin.

Optimize recovery and regeneration programs – periodize recovery.

Optimize ancillary capacities.

Optimize mental fitness development.

The following considerations are true for the mental, cognitive and emotional development of individuals in Train to Compete:

- **Mental and cognitive** – Generally, by age 16 the brain has reached its adult size but continues to mature neurologically for several more years. Thus, critical thinking is well developed during this phase. Participants will continue to develop logical thought and deductive reasoning.
- **Emotional** – Participants are searching for a stable, balanced self-image, though peer group influence is still a powerful force. This is also a key time for individuals to "find themselves" within sport, and they should be granted the opportunity to explore and experiment within their sport or activity. Activities and interaction with the opposite sex are also important during this phase.


## Train to Compete Checklist:

- ☐ Provide year-round, high intensity, individual-, event- and position-specific training.
- ☐ Teach athletes, who are now proficient at performing basic and sport-specific skills, to perform those skills under a variety of competitive conditions during training.
- ☐ Place special emphasis on optimum preparation by modelling competitions in training.
- ☐ Individually tailor fitness programs, recovery programs, psychological preparation and technical development.
- ☐ Emphasize individual preparation that addresses each athlete's individual strengths and weaknesses.
- ☐ Select one sport or, at most, two complementary sports (speed skating and cycling for example) in which to specialize.
- ☐ Utilize single, double and/or triple periodization as the optimal framework of preparation.
- ☐ Change the training-to-competition and competition-specific training ratio to 40:60. Devote 40 percent of available time to the development of technical and tactical skills and improving fitness, and 60 percent to competition-specific training and actual competitions.

# Train to Win

Chronological Age
Males 19 +/- and Females 18 +/-


## Objective:

Performance on demand.

Maximize fitness preparation and sport-, individual- and position-specific skills as well as performance.

Train to Win is the final stage of athletic preparation.

All of the athlete's physical, technical, tactical (including decision-making skills), mental, personal and lifestyle capacities are fully established and the focus of training has shifted to the maximization of performance.

World class able-bodied and disability sport performances require world-class equipment that is fine-tuned to the demands of the event and the requirements of the athlete.

Maximize recovery and regeneration programs – periodize recovery.

Maximize ancillary capacities.

Maximize mental fitness.

The following considerations are true for the mental, cognitive and emotional development of individuals in the Train to Win stage:

- **Mental and cognitive** – Neurologically, the brain matures at about 19 to 20 years of age. At this point, there is a complete understanding and acceptance of the need for rules, regulations and structure.
- **Emotional** – At this stage, self-actualization and self-expression are important and there is a need to be self-directed and independent. Major decisions on career, education and lifestyle are now of significant importance. Interactions with the opposite sex continue to be a strong priority with lasting relationships being formed.

## Train to Win Checklist:

- ☐ Train athletes to peak for major competitions – performance on demand.
- ☐ Ensure that training is characterized by high intensity and relatively high volume all year round.
- ☐ Allow frequent preventative breaks to prevent physical and mental burnouts.
- ☐ Utilize single, double, triple or multiple periodization as the optimal framework of preparation.
- ☐ Change the training-to-competition ratio 25:75, with the competition percentage including competition-specific training and actual competitions.

# Active for Life

Enter at any time after the onset
of the growth spurt


## Objective:

A smooth transition from developing physical literacy to lifelong physical activity and participation in sport, or from the sport excellence stream to competitive for life, fit for life or engagement as a sport and physical activity leader.

**Competitive for Life** embodies all sport that functions under a set of rules, with the exception of the excellence pathway, which is defined by Train to Train, Train to Compete and Train to Win.

- Minimum of 60 minutes moderate daily activity or 30 minutes of intense activity for adults.
- Transfer from one sport to another. For example, the gymnast becomes an aerial skier, the sprinter takes up bobsledding or the 12-year-old basketball player discovers canoeing.
- Move from one aspect of sport to another. For example, the middle distance runner becomes a guide runner for blind athletes or the cyclist rides tandem at the Paralympic Games.
- Move from highly competitive sport to lifelong competitive sport through age group competition, such as Masters Games.
- Embrace an active lifestyle by participating in an organized sport they have not taken part in before.

**Fit for Life** includes all physical activity such as hiking, gardening, yoga, aerobics, skiing and walking, as well as non-organized sport (self-determined rules) such as pick-up games in the school yard or park.

- Minimum of 60 minutes moderate daily activity or 30 minutes of intense activity for adults.
- Move from competitive sport to recreational activities such as running, walking, hiking and cycling.
- Use the skills developed in one sport or activity to foster involvement in others.
- Keep active by continuing to participate in non-organized physical activity.
- Develop an active lifestyle by participating in non-organized sport or physical activity that may be unfamiliar.
- Being active for life is more likely if physical literacy is achieved before the Train to Train stage.

# A positive experience in sport is the key to retaining athletes after they leave the competition stream.

Sport must make a paradigm shift from cutting athletes from a sport without care for where they end up, to re-directing them to sports where they are predisposed to train and perform well. This is partly about talent transfer; even if an athlete doesn't have the required ability to advance in a given sport, they likely have skills and abilities that could transfer into other sports or physical activities. This is also about having people continue to participate in sport and activity. If they are cut from a sport, but then offered direction and guidance to continue participation (whether in that sport or in something different), they will be more likely to continue than if they are cut and left on their own.

**Sport and Physical Activity Leaders** includes those individuals who contribute in ways other than being an athlete or participant in the sport or activity itself. This group encompasses coaches and instructors, officials, administrators in either a volunteer or professional capacity, and those involved in sport science and medicine. It is possible that these individuals take part in the Competitive for Life and/or Fit for Life streams.

- Use experience, whether from previous involvement or education, to help ensure a positive environment for participants.
- Upon retiring from competitive sport, move to sport-related careers such as coaching, officiating, sport administration, small business enterprises or media.
- Move from competitive sport to volunteering as a coach, official and/or administrator.

The following considerations are true for the mental, cognitive and emotional development of individuals in Active for Life:

- **Mental and cognitive** – This development is dependent upon what age an individual enters this stage. If an individual enters Active for Life at the Train to Train, Train to Compete or Train to Win stages, there will still be mental and cognitive development occurring. If an individual enters this stage later in life, there will be no further neurological development.
- **Emotional** – This development is dependent upon what age an individual enters this stage. If an individual enters Active for Life at the Train to Train, Train to Compete or Train to Win stages, there will still be emotional development occurring. When entered later in life, the focus shifts to being self-motivated and independent, while ensuring a healthy balance between any training, competition and lifestyle.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# Impact of Canadian Sport for Life – Long-Term Athlete Development

## On Parents

Few adults who were physically inactive as children become active as adults. Inactive adults tend to result in inactive children and the reverse is also true. Encouraging children to enjoy moving and promoting confidence in movement skills at an early age helps to ensure later participation in physical activity.

CS4L, including LTAD, can help to:

- Provide a framework for parents to understand physical literacy and its implications on a healthy lifestyle through lifelong physical activity and on competitive sport involvement for all Canadians, including those with a disability.
- Facilitate the understanding of physical, mental, cognitive and emotional development.
- Facilitate the understanding of special requirements such as proper hydration, nutrition and recovery for the growing child.
- Enable parents to help children to choose a pathway in physical activity and sport.
- Encourage parents to understand and support changes in the competition schedule and structure of their child's sport.

## On Coaching

To be successful, an athlete development framework such as LTAD requires highly skilled, trained or certified coaches who understand the stages of athlete development and the various interventions that should be made.

CS4L, including LTAD, can help you to:

- Have a significant impact on coaching education curriculum and sport-specific coaching education by NSOs.
- Identify a need for part-time and full-time coaches who will specialize in coaching developmental athletes.

# On Clubs and Community Sport and Recreation

Canada's sport clubs and community centres provide broad opportunities for participation and are essential to the successful implementation of LTAD from playground to podium.

CS4L, including LTAD, can help you to:

- Identify the need for programs to deliver high quality sport, particularly in the first three stages.
- Inform and educate staff and community leaders about the benefits of CS4L – LTAD.
- Align programs with schools, clubs and community sports.
- Rationalize the competition system at the national and provincial levels and in clubs, community sport and recreational activities.

## On the Education System

There is growing recognition of the urgent need for Canada's school children to become much more physically active. It is imperative that the education system assumes a prominent role in addressing the significant health problems that arise from an inactive lifestyle.

CS4L, including LTAD, will:

- Highlight the need for daily quality physical education.
- Highlight the need to improve training for teachers in the elementary schools to understand the concept of physical literacy and CS4L – LTAD and correctly model and teach fundamental movement skills and foundation sports skills.
- Encourage new courses at colleges and universities to ensure that educators and coaches are familiar with physical literacy and CS4L – LTAD and can apply these when teaching and coaching.
- Encourage the establishment of sport academies and Sport-Étude programs enriching the training environment during the Train to Train phase.

# On the Sport System

The Canadian Sport Policy 2012 contains five major goals and five major outcomes

**Goals:**

1. Introduction to sport
2. Recreational sport
3. Competitive sport
4. High performance sport
5. Sport for development

**Outcomes:**

1. Excellence
2. Enhanced education and skill development
3. Improved health and wellness
4. Increased civic pride, engagement and cohesion
5. Increased economic development and prosperity

# On the Sport System Cont.

CS4L, including LTAD, will ensure:

- An increasing number of children develop physical literacy resulting in the improved health and wellness of society.
- That a significantly higher proportion of Canadians from all segments of society are involved in quality sport activities at all levels and in all forms of participation.
- A great number of children will have an athletic foundation that can be developed through developmentally appropriate training, competition and recovery programs towards achieving world-class results at the highest levels of international competition through fair and ethical means.
- That the essential components of an ethically based, athlete/participant-centred development system are in place and are continually modernized and strengthened as required; the components of the sport system are more connected and coordinated as a result of the committed collaboration and communication amongst the stakeholders.


## These goals can be achieved through the system-wide integration of Canadian Sport for Life including Long-Term Athlete Development.

CS4L, including LTAD, can help you to:

- Signal radical changes to the structure and delivery of programs.
- Cause realignment or rescheduling and restructuring of competition calendars.
- Provide clear pathways for athlete/participant progression.
- Help athletes attain higher and more sustained levels of success.
- Provide athlete-centred planning and decision making.
- Provide a basis on which to monitor and evaluate the effectiveness of programs.
- Provide a framework so that all stakeholders understand their role in programming interventions at each stage.

# On Sport Science

Canada's sport scientists play a vital role in helping athletes and coaches to keep pace with international competition by contributing to their understanding of the science behind their sport's techniques. Sport scientists have an important role in developing new methodologies and monitoring sport science innovations around the world for continuous improvement of Canada's sporting techniques.

CS4L, including LTAD, will:

- Encourage research into all aspects of LTAD, including:
  - Physical development;
  - Mental/cognitive development;
  - Emotional development, trainability and readiness factors;
  - How organizations adopt and align to LTAD values and principles.
- Provide developmentally appropriate competition for all stages.
- Establish proper periodization principles, e.g. length of the competitive phase for all stages.
- Establish normative data for all the stages of LTAD.

# Integration

## Canadian Sport Working Together

The federal, provincial and territorial governments have taken giant steps forward in endorsing the concept of CS4L – LTAD. The same level of support must also come from municipalities, recreation centres, schools and clubs.



Acceptance of CS4L – LTAD provides the basis on which future development of athletes is planned and implemented.

Since the publication of the *Canadian Sport for Life – Long-Term Athlete Development Resource Paper (2005)*, several documents have been prepared that address implementation. The following documents include more information on implementation:

**CS4L Moving Forward –** CS4L has become a movement of like-minded people who want to improve the quality of sport in Canada. This document is the Plan for the Movement.

**CS4L Five-Year Activation Strategy –** The CS4L Activation Strategy will inform key supporters, such as Sport Canada, about the direction and actions required for the continued improvement of the quality of sport in Canada. It will serve as a touchstone for the CS4L Leadership Team to build and enhance relationships with other sectors, agencies and organizations contributing to sport and physical activity in Canada, and will allow CS4L Champions to continue to own and advance CS4L.

**Shaping the Ideal NSO –** This Guide is intended as a resource to assist NSOs in determining the next steps for LTAD implementation. It provides guidance through the four major implementation steps, identifying support (written, human and financial) for LTAD implementation while recognizing that implementation may look different for each organization.

# Summary

## Canadian Sport for Life – Long-Term Athlete Development

- Is a paradigm shift in the way Canadian sport is designed and delivered, and gives meaning to the concept of an athlete-centred approach
- Is a philosophy and a vehicle for change
- Is athlete-centred from a child's first involvement in sport to the transition to lifelong physical activity or other sport related activities, and includes development of athletic performance to the highest level of which the individual is capable and to which they desire to aspire
- Integrates the needs of athletes with a disability into the design and delivery of sport programs
- Provides a framework for reviewing current practices, developing new initiatives and standardizing programs
- Establishes a clear development pathway from playground to podium and to being active for life
- Identifies the shortcomings in Canada's sport system and provides guidelines for problem solving
- Provides guidelines for planning for optimal performance at all stages of athlete development.
- Provides key partners with a coordinated structure and plan for change.
- Identifies and engages key stakeholders in delivering quality sport and physical activity programs in sport, recreation, education and health.
- Provides an aligned and integrated framework for delivering systems including:
  - Long-Term Athlete Development: technical, physical, tactical and behavioural
  - Long-Term Coach Development
  - Long-Term Officials' Development
  - Long-Term Community Development
  - Long-Term Volunteer Development
  - Sport and physical activity programs and services in NSOs, PSOs, recreational organizations, clubs and schools

"Insanity is doing the same thing over and over again and expecting different results."

– Albert Einstein

# Glossary

**Active for Life** is a movement within the Sport for Life framework in which Canadians become active for life by developing physical literacy. Along with physical literacy and sport excellence, Active for Life is one of CS4L's three key outcomes. This stage can be entered at any age (after the onset of the growth spurt), beginning with developing physical literacy in infancy, and evolves to being Competitive for Life, Fit for Life and/or Sport and Physical Activity Leaders through all phases of adulthood.

**Competitive for Life,** within Active for Life, is the final LTAD stage of CS4L, where Canadians are active for life through participation in competitive sport.

**Fit for Life,** within Active for Life, is the final LTAD stage of CS4L, where Canadians are active for life through participation in recreational physical activity.

**Sport and Physical Activity Leaders,** within Active for Life, is the final LTAD stage of CS4L, where Canadians contribute to the sport and physical activity experience as professional of volunteer administrators, coaches, instructors, or officials, or through sport science and medicine.

**Adaptation** refers to a response to a stimulus or a series of stimuli that induces functional and/or morphological changes in the organism. The level or degree of adaptation is dependent upon the genetic endowment of an individual. However, the general trends or patterns of adaptation are identified by physiological research, and guidelines are clearly delineated of the various adaptation processes, such as adaptation to muscular endurance or maximum strength.

**Adolescence** is the period during which most bodily systems become adult, both structurally and functionally. It is a difficult period to define in terms of the time of its onset and termination. Structurally, adolescence begins with an acceleration in the rate of growth in stature, which marks the onset of the adolescent growth spurt. The rate of height growth reaches a peak (PHV), begins a slower or decelerative phase and finally terminates with the attainment of adult stature. Functionally, adolescence is usually viewed in terms of sexual maturation, which begins with changes in the neuroendocrine system prior to visible physical changes and terminates with the attainment of fully mature reproductive function.

**Age** **Chronological age** refers to the number of years and days elapsed since birth. Growth, development and maturation operate in this time framework.

**Relative age** refers to differences in age among children born in the same calendar year.

**Developmental age** refers to the degree of physical, mental, cognitive and emotional maturity. Physical developmental age can be determined by skeletal maturity or bone age after which mental, cognitive and emotional maturity is incorporated.

**Skeletal age** refers to the maturity of the skeleton determined by the degree of ossification of the bone structure. It is a measure that takes into consideration how far given bones have progressed toward maturity, not in size, but with respect to shape and position to one another.

**General training age** refers to the number of years in training in different sports.

**Sport-specific training age** refers to the number of years since an athlete decided to specialize in one particular sport.

**Ancillary Capacities** refer to the knowledge and experience base of an athlete and includes warm-up and cool-down procedures, stretching, nutrition, hydration, rest, recovery, restoration, regeneration, metal preparation, and tapering and peaking.

The more knowledgeable athletes are about these training and performance factors, the more they can enhance their training and performance levels. When athletes reach their genetic potential and physiologically cannot improve anymore, performance can be improved by using the ancillary capacities to full advantage.

**Canadian Sport for Life** is a movement to improve the quality of sport and physical activity in Canada. It links sport, education, recreation and health, and aligns community, provincial and national programming. CS4L's vision is quality programs for all Canadians based on developmentally appropriate sport and physical activity. CS4L's mission is to improve the health, wellness and sporting experiences of all Canadians by advancing physical literacy, improving performance and increasing lifelong participation in physical activity. When enacted, CS4L's values and principles link and integrate programs delivered by health, recreation, education and sport, and align programming in clubs, provincial/territorial and national sport and multi-sport organizations. CS4L addresses the overarching system and structure of sport and physical activity in Canada, including the relationship between school sport, physical education and organized sport at all levels, from policy to program delivery.

**Childhood** ordinarily spans the end of infancy (the first birthday) to the start of adolescence and is characterized by relatively steady progress in growth and maturation and rapid progress in neuromuscular or motor development. It is often divided into early childhood, which includes pre-school children aged one to five years, and late childhood, which includes elementary school-age children aged six through to the onset of adolescence.

**Development** refers to both biological and behavioural contexts. In terms of the biological, "development refers to the processes of differentiation and specialization of pluripotent embryonic stem cells into different cell types, tissues, organs and functional units" *(Malina et al., 2004, p. 5).* For behavioural, this term "relates to the development of competence in a variety of interrelated domains as the child adjusts to his or her cultural milieu – the amalgam of symbols, values and behaviours that characterize a population" (p. 5).

**Sensitive periods of development** refer to the points in the development of a specific behaviour when experience or training has an optimal effect on development.

**Long-Term Athlete Development** is a multi-stage training, competition and recovery pathway guiding an individual's experience in sport and physical activity from infancy through all phases of adulthood. LTAD is athlete centered, coach driven and administration, sport science and sponsor supported. Sequential stages in the LTAD pathway provide developmentally appropriate programs for all ages to increase participation and optimize performance. Key to LTAD is a holistic approach that considers mental, cognitive and emotional development in addition to physical development, so each athlete develops as a complete person. Based on CS4L principles, LTAD, in a sport-specific context, promotes system alignment and integration between sport club, provincial/territorial and national sport organizations.

**Peak Height Velocity (PHV)** is the maximum rate of growth in stature during the adolescent growth spurt. The age of maximum velocity of growth is called the age at PHV. The onset of the growth spurt, the fastest rate of growth or PHV and the onset of the menarche are biological markers to identify the sensitive periods of accelerated adaptation to training.

**Physical Literacy** means having the fundamental movement skills, fundamental sports skills and motivation that enable an individual to read their environment and make appropriate decisions while moving confidently and with control in a wide range of physical activities in both indoor and outdoor environments.

**For parents:** Individuals are physically literate when they have acquired the skills and confidence to enjoy a variety of sports and physical activities.

**For coach and instructor:** Individuals are physically literate when they demonstrate competence and confidence in fundamental movement skills and foundation sport skills combined with the ability to read their environment and make appropriate decisions. Physical literacy allows individuals to enjoy a variety of sports and physical activities.

**For educators and health practitioners:** Individuals who are physically literate move with competence and confidence in a wide variety of physical activities in multiple environments that benefit the healthy development of the whole person *(PHE Canada definitions, 2007).*

**Puberty** refers to the point at which an individual has matured sexually and is able to reproduce.

**Readiness** refers to the child's level of growth, maturity and development that enables him/her to perform tasks and meet demands through training and competition. Readiness and sensitive periods of trainability during growth and development of young athletes are also referred to as the correct time for the programming of certain stimuli to achieve optimum adaptation with regard to motor skills, muscular and/or aerobic capacity and power.

**Specialization** refers to athletes limiting participation to a single sport, which they train for and compete in on a year-round basis. There are sports that require either early or late specialization in order for an athlete to succeed.

**Trainability** refers to the genetic endowment of athletes as they respond individually to specific stimuli and adapt to it accordingly. Malina et al. (2004) define trainability as "The response of maximal oxygen uptake and of other phenotypes to training" (Malina, Bouchard, Bar-Or, 2004, p. 392).

# Canadian Sport LTAD Frameworks

**Alpine Canada –** "Long Term Skier Development for Alpine Ski Racing"

**Archery Canada –** "Shoot for Fun, Shoot to Excel, Shoot for Life"

**Athletics Canada –** "Long-Term Athlete Development"

**Badminton Canada –** "Badminton for Life"

**Baseball Canada –** "Long-Term Athlete Development: Canadian Leader in Throwing, Catching and Hitting"

**Canada Basketball –** "Canadian Basketball Athlete Development Model"

**Biathlon Canada –** "Long-Term Athlete Aevelopment Model"

**Canadian Cerebral Palsy Sports Association –** "Boccia Long-Term Athlete Development Model: Boccia for All Ages and Abilities"

**Bowling Federation of Canada** – "Long-Term Athlete Development Plan for Bowling"

**Boxing Canada –** "Long-Term Athlete Development"

**Canadian Broomball Federation –** "Long-Term Athlete Development"

**CanoeKayak Canada (Sprint and Whitewater) –** "Long-Term Athlete Development Plan"

**Cross-Country Canada –** "Long-Term Athlete Development: ASport for Life"

**Canadian Curling Association –** "Long-Term Athlete Development for Curling in Canada: Curling for Life"

**Canadian Cycling Association** – "Long-Term Athlete Development"

**BMX**
**Mountain biking**
**Para-cycling**
**Track**

**Diving Canada –** "Long-Term Athlete Development Model: Foundations of Excellence"

**Equine Canada –** "Long-Term Equestrian Development"

**Canadian Fencing Federation –** "Long-Term Athlete Development"

**Field Hockey Canada –** "Long-Term Hockey Development: Implementation Resource Oaper"

**Football Canada –** "Long-Term Athlete Development: Football for Life"

**Canadian Freestyle Ski Association –** "Intro to Long-Term Athlete Development for Canadian Freestyle Skiing"

**Golf Canada –** "Long-Term Player DevelopmentGuide for Golf in Canada"

**Gymnastics Canada –** "Long-Term Athlete Development Gymnastics: The Ultimate Human Movement Experience"

**Hockey Canada –** "Long-Term Player Development Plan: Hockey for Life, Hockey for Excellence"

**Judo Canada –** "Long-Term Athlete Development: Taking it to the Mat"

**National Karate Association of Canada –** "Karate for Life: Karate Canada's Long-Term Athlete Development Model"

**Canadian Lacrosse Association –** "Long-Term Athlete Development for Canadian Lacrosse Stages"

**Bowls Canada (lawn bowling) –** "Bowls: A Sport for Life"

**Canadian Sport Parachuting Association –** "Flight Plan: Long-Term Athlete Development for Skydiving in Canada"

**Racquetball Canada –** "Long-Term Athlete Development Plan"

**Ringette Canada –** "Long-Term Athlete Development framework document"

**Rowing Canada Aviron –** "Long-Term Athlete Development plan for rowing: An overview"

**Rugby Canada –** "Community and Country: Long-Term Rugby Development Model"

**Sail Canada –** "Long-Term Sailor Development: Sailing to Win, Sailing for Life"

**Shooting Federation of Canada** – "Long-Term Athlete Development Target Shooting: A Lifetime Sport"

**Canada~Snowboard –** "Park to Podium: Canada~Snowbaord's Long-Term Athlete Development Plan"

**Canadian Soccer Association –** "Long-Term player Development: Wellness to World Cup"

**Softball Canada –** "Long-Term Player Development Guide for Softball in Canada"

**Special Olympics Canada –** "Long-Term Athlete Development for Athletes with an Intellectual Disability"

**Speed Skating Canada –** "Racing on Skates"

**Squash Canada –** "Beyond the Nick: Long-Term player Development"

**Swimming Canada –** "Swimming to Win; Winning for Life"

**Synchro Canada –** "Long-Term Athlete Development"

**Table Tennis Canada –** "Table tennis 4 life: Long Term Athlete Development Model"

**Taekwondo Canada –** "Taekwondo for Life"

**Tennis Canada –** "A Sport for Life: Long Term Athletic Development Plan for the Sport of Tennis in Canada"

**Triathlon Canada –** "Long Term Athlete Development"

**Volleyball Canada –** "Volleyball for Life: Long-Term Athlete Development for Volleyball in Canada"

**Water Polo Canada –** "Long-Term Athlete Development: The Pursuit of Excellence and an Active Lifestyle"

**Water Ski and Wakeboard Canada –** "Waking up Champions: Long-Term Athlete Development"

**Canadian Weightlifting Federation –** "Transition Phase: Long-Term Athlete Development"

**Canadian Wheelchair Sports Association –** "Full contact: A Long-Term Athlete Development Model for Wheelchair Rugby in Canada"

**Wrestling Canada –** "Long-Term Athlete Development Model"

**Wheelchair Basketball Canada –** "Athlete Development Model Volume 1: LTAD Overview"

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Published by Canadian Sport Institute – Pacific 2014



*Canadian Sport for Life – Long-Term Athlete Development Resource Paper 2.0*

ISBN 978-1-927921-01-2

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Canadian Sport for Life thanks Canadian Heritage (Sport Canada)
for contributing to the development of the publication.

We acknowledge the financial support of the Government of Canada through Sport Canada,
a branch of the Department of Canadian Heritage.

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**Canadian Sport for Life would also like to thank the Canadian Sport Institute – Pacific for sourcing photographs and the following organizations for contributing photographs: Arctic Winter Games, Athletics Canada, Baseball Canada, Biathlon Canada, Canada Snowboard, Canadian Cycling Association, Canadian Freestyle Ski Association, Canadian Olympic Committee, Canadian Soccer Association, Canoe Kayak Canada, Cross Country Canada (Para-Nordic), Diving Canada, Hockey Canada, Freestyle Ski Canada, Rugby Canada, Rowing Canada, Skate Canada, Swimming Canada, Table Tennis Canada, Volleyball Canada, Wheelchair Basketball Canada.**

**Lastly, Canadian Sport for Life would like to thank the great athletes of the current, past and future who were featured in the first edition of the Canadian Sport for Life Resource Paper as well and the photographers who contributed photographs.**

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