



Canoeing South Africa Long Term Participant Development Model



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Foreword

Sprint Canoeing remains a relatively small sport within the sporting landscape of South Africa which has resulted in a limited talent pool being available from which to draw potentially elite athletes. In order for Canoeing South Africa (CSA) to maximise the use of our available talent to not only ensure international success but long term athlete retention a suitable framework for development needs to be adopted. Long Term Participant Development (LTPD) is one such framework, it is a planning tool for optimal performance for all stages of athlete development, and will ensure that all paddlers are equipped with the fundamental building blocks required to progress through the sport. It is based on empirical data, practical coaching experiences and scientific principles and integrates health and education with sport and physical activity. LTPD will serve as a guideline for development of athletes, coaches, parents and volunteers at every level of paddling. As well as forming the starting point from which to examine the current system in South Africa in order to identify strengths, gaps, and inconsistencies; to guide coaches in planning training, racing, and recovery programs that are consistent with the principles of growth and maturation, to allow athletes to achieve optimal performances, and to encourage them to stay in the sport for life. Ultimately leading to an increase in participation across all kayaking disciplines and improvement in performance through exposure to this sprint based LTPD plan.

Introduction

Long Term Participant Development (LTPD) is a framework that allows athletes to follow a mapped out path of development allowing them to maximise their potential through optimal training, competition, and recovery techniques throughout their athletic careers. However it is not only about ensuring success at the highest levels of competition but also includes a focus on supporting life-long participation in canoeing and other physical activity.

What makes LTPD different from existing models of training and participation drives in canoeing is that it shifts the focus of training, racing, and recovery programs to being based on an athlete's developmental age rather than their chronological age, and is designed to optimise development sensitive periods of maturation and trainability. LTPD also takes into account the physical, mental, emotional, and cognitive development of all participants.

As canoeing is a late specialisation sport, which means that most competitors will not achieve their maximum potential until their mid-twenties, athlete development is a long term process which requires a solid foundation in movement skills and fitness. Therefore in order to reach their maximum potential, canoeing athletes need to build their physical literacy as children – the mastering of fundamental movement skills and fundamental sport skills – by participating in a wide variety of sports and physical activity when they are young. It should be noted that early specialisation in canoeing can harm the long term development of the athlete.

LTPD provides coaches, administrators, Clubs, and others involved in the development of athletes a clear understanding of how they can best support the athletes for whom they are responsible by following a transparent and seamless development pathway. It gives athletes a clear idea of what they need to do and

when they need to do it in order to excel at each stage of LTPD, ultimately leading to a life-long enjoyment of canoeing.

It is a pathway that is based on sound scientific tools, research and principles as indicated by the following ten key factors.

The Ten Key Factors Influencing LTPD

1. Physical Literacy

Physical literacy is the development of fundamental movement skills and fundamental sport skills that permit a child to move confidently and with control in a wide range of physical activity. The development of these fundamental skills - agility, balance, co-ordination – and fundamental sport skills – running, jumping, throwing, kicking, catching, and swimming – are the foundation for all other sports, and Children should develop these skills before the onset of their growth spurt in adolescence. An individual who is not competent in the basic movement skills will have difficulty participating in a range of sports and will have fewer opportunities for athletic success and life-long enjoyment of physical activity.

2. Specialisation

Canoeing is a late-specialisation sport and is somewhat dependent on other components of the school sport system, and other sports, to provide children with opportunities to develop physical literacy and early speed and suppleness (during the Fundamentals and Foundations Stage). Athletes need to participate in a variety of sports and physical activity during the FUNdamental and Foundations stage in order to succeed in a late-specialisation sport. Specialising early in a late specialisation sport can contribute to limited skill development and deficiencies in basic physical literacy leading to injuries, early burnout & early retirement.

3. Age

Although we all follow the same stages of development from early childhood through adolescence, the timing, rate, and magnitude of development differs amongst individuals. This can lead to a situation in which children during late childhood and adolescence, who are the same chronological age, may be four to five years apart developmentally, making it critical for coaches to understand these developmental differences and take them into account when they design training programs and select athletes.

LTPD is based on developmental age, not chronological age therefore it is critical that we understand the differences between the two:

- Chronological age refers to the number of years and days elapsed since birth,
- Developmental age refers to the degree of physical, mental, cognitive, and emotional maturity of the individual. One way of determining physical developmental age is through skeletal maturity or bone age determined by x-raying the wrist and hand. Once this has been determined further assessment of the individuals unique mental, cognitive, and emotional

maturity needs to be done. It is important to identify early, average and late maturing individuals.

The developmental age of an individual will determine when various aspects of sport and physical activity should be introduced or emphasized. The LTPD model uses the categories "early", "average" (on-time), or "late" maturers to identify the participant's developmental age. These designations help coaches and instructors to design instructional, training and competition programmes that are appropriate for the participant's level of development. See the "Monitoring Growth in LTAD" document (www.canadiansportforlife.ca)

As individuals mature, there are sensitive periods when there is accelerated adaptation to training. The LTPD model identifies these periods and makes maximum use of them to introduce skill and fitness development. Figure 1 graphically shows the rate of change in height in boys (left-hand) and girls (right-hand) through these key growth periods.

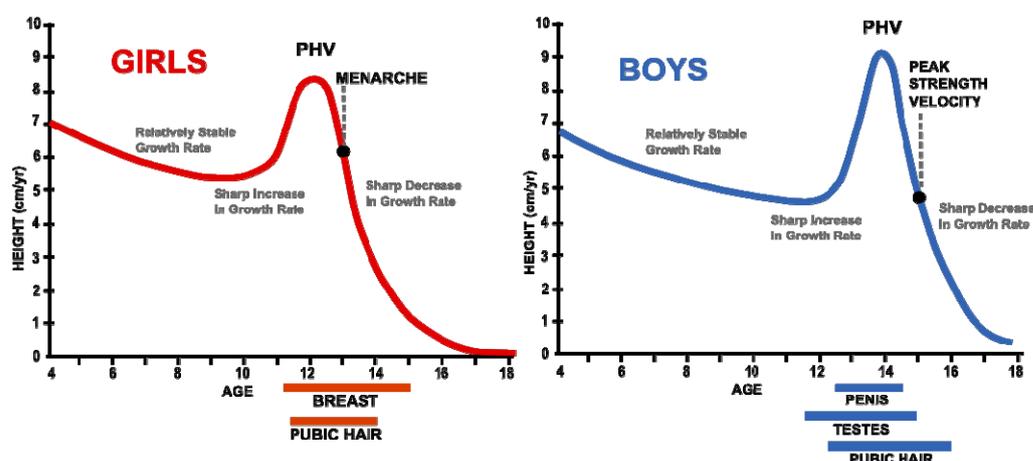


Figure 1: Rate of Change in Height & Peak Height Velocity (PHV), Left – Girls, Right – Boys; highlighting key physical development indicators (adapted from CS4L (2005))

It has been suggested that PHV in girls occurs at about 12 years of age and 14 years of age for boys. Peak Strength Velocity (PSV) comes a year or so after PHV. It should be noted that early maturers may have as much as a 4-year physiological advantage over their late-maturing peers. Eventually, the late maturers will catch up when they experience their growth spurt.

4. Trainability

All physiological systems are always trainable, but there are sensitive periods in development when the body is particularly responsive to specific types of training. To reach their genetic potential, athletes need to do the right type of training at the right stage. Athletes who miss these windows of trainability can still compete at the highest level, but it will require more time and effort for them to enhance these capacities to the same level as those who did the right training at the right time.

5. **Physical, Mental, Cognitive, & Emotional Development: A Holistic Approach**
Coaches should consider the whole athlete. At each stage, coaches should consider the emotional, mental, and cognitive development of each athlete, in addition to their physical development, when they plan training, racing, and recovery programs.

6. **Periodization**

Periodization provides the framework for organising training (for example, mode, volume, intensity, frequency of training), racing, and recovery into a logical and scientifically based schedule in order to achieve optimum performance at the required time. A periodization plan that takes into account growth, maturation, and trainability principles should be developed for each stage of athlete development.

7. **Calendar Planning for Competition**

The racing calendar should support and be consistent with LTPD. Different stages of development have different requirements for the type, frequency, and level of competition. At some stages of development (for example, Training to Train), training and development should take precedence over formal racing and short-term success. At later stages, it becomes more important for athletes to experience a variety of competitive situations and to perform well at high-level regattas.

8. **System Alignment and Integration**

LTPD recognises that physical education, school sports, recreational activities, and competitive sports are interdependent. For example, as a late-specialisation sport, canoeing depends on schools, and other sports to provide children with opportunities to develop physical literacy and early fitness. LTPD recognises that enjoying a lifetime of physical activity and achieving athletic excellence are both built on a foundation of physical literacy and fitness. All elements of the sport system must be integrated and aligned with one another to achieve these goals. Similarly, all parts of the Canoeing South Africa system – CSA, Provincial unions, school leagues, and Clubs must be integrated and aligned with one another. Each element in the system plays a crucial role in athlete development. For the system to work well, they must be mutually supportive, clear in their roles and responsibilities, and clear in how they contribute to the “bigger picture” of athlete development. Athletes do best in a system that is clear, seamless, and based upon a consistent set of principles. LTPD allows paddlers to identify the opportunities available to them and to understand the pathway they need to follow. If they want to paddle at an elite level, they will know (in general terms) what type of training, racing, and recovery they should be doing at each stage, when they should start to specialise in paddling, and what they need to do to move up through the system. They (and their parents) will have the knowledge to campaign for programs, coaching, equipment, races, and other services that will support their long-term development and vastly improve an athletes’ retention in the sport.

9. Success Takes Time

Scientific research has identified that it takes approximately 10 years and 10,000 hours of training for a talented athlete to reach elite levels. There are no shortcuts; athlete development is long-term process, and short-term performance goals must not be allowed to undermine long-term athlete development.

10. Continuous Improvement

LTPD is based on the best available scientific research and empirical evidence, but knowledge and understanding evolve. Therefore LTPD should respond to, integrate, and, in some cases, stimulate research and canoe-specific innovations in order to maintain relevance and help our athletes stay ahead of the rest.

Before examining trainability in greater depth it is crucial that the following issues hinted at in the 10 key factors above and later on in the actual stages of LTPD be examined in greater detail

Psychology

Sport is physically and mentally demanding, the ability to maintain high levels of concentration, remain relaxed, and believe in one's ability to succeed are skills that are vital for success. To develop the required mental toughness for success at the highest levels requires training programs which are designed specific to the gender and LTPD stage of the participant. These programs should include key mental components identified by sport psychologists such as; concentration, confidence, motivation and handling pressure. As a participant progresses through LTPD stages the mental training aspect will evolve from: having fun and respecting opponents; to visualization and self-awareness; to goal setting, relaxation and positive self-talk. To master these mental aspects the participant will then need to test themselves in increasingly difficult competitive environments. Ultimately the planning, implementing and refining of mental strategies for high level competition will determine international success. The mental training program is critical at all LTPD stages as dealing with success and failure will determine whether the participant remains in the sport for life.

Sustenance

Sustenance covers a broad range of components with the central theme of replenishing the body. Sustenance is vital to prepare the participant for the volume and intensity required to optimise training or living life to the fullest. Areas addressed are: nutrition, hydration, rest, sleep and regeneration, all of which need to be applied different to training plans depending on the stage within the LTPD. Crucial to this process is the need for optimal recovery management which requires a 24/7 monitoring model which places a high degree of importance on the individual's activities away from the field of play. This requires daily monitoring by the coach or parent in order to identify fatigue and overtraining. Fatigue can come in many forms including: metabolic; neurological; psychological; environmental and travel. While overtraining or over-competition can lead to burn-out, improperly addressing sustenance can lead to the same result. See the "Recovery and Regeneration for Long-Term Athlete Development" document (www.canadiansportforlife.ca)

Schooling

The recognition of the demands of schooling/University need to be taken into account when designing training programs, this is not only limited to the demands of school sports or physical education classes, but includes integrating school academic loads, duties, school related stresses, and timing of exams. When possible, training camps and competition tours should complement, not conflict, with the timing of major schools academic events. In this environment overstress should be monitored carefully. Overstress refers to the everyday stresses of life, like schooling, exams, peer groups, family, boyfriend or girlfriend relationships as well as increased training volume and intensities. A good balance should be established between all factors and the coach and the parents should be working on this together.

Socio-Cultural

South Africa has a population with a wide variation in ethnicity and a healthy cultural diversity, therefore in order to be successful our sport needs to be sensitive to these factors, and embrace the opportunities that they present. As a participant progresses through the LTPD stages coaches need to be aware of cultural issues which may impact on training and be sensitive to and guard against group dynamics which foster a culture of abuse or bullying. Ethics training should be integrated into training and competition plans at all stages of LTPD. Once a participant reaches international level the opportunity to broaden their perspective can be a valuable experience and national and international travel schedules should include exposure to the local history, geography, architecture, cuisine, literature, music and visual arts. At this level proper planning can allow sport to offer much more than simply commuting between hotel room and field of play.

The underlying principle of LTPD is doing the right thing at the right time and core to the understanding of this is the concept of trainability.

Trainability

Trainability refers to how responsive an individual is to a training stimulus at different stages during growth and maturation. Although all physiological capacities are always trainable, there are sensitive periods in the development of a specific capacity during which training has the most effect. These are referred to as “sensitive periods” of accelerated adaptation to training.” Correct training during these sensitive periods is essential for individuals to achieve their genetic potential. Scientific evidence shows that humans vary considerably in the magnitude and rate of their responses to a given stimulus. This variability underlines the need for a long-term approach to athlete development, so that athletes who respond slowly are not short-changed. Sport scientists have identified five physical capacities (the five S’s of Training and Performance): Stamina, Strength, Speed, Skill, and Suppleness. For stamina, strength, and skill the sensitive periods of trainability are based on developmental age; specifically, the onset of the adolescent growth spurt. For speed, skill and suppleness, the sensitive periods of trainability are based on chronological age (not developmental age). Note that, on average, girls reach these windows of trainability at a younger chronological age than boys.

In order to identify the relevant sensitive periods for accelerated adaptation to training and to ensure the correct design and implementation of optimal training, competition and recovery programs the following diagrams can be used as a guide.

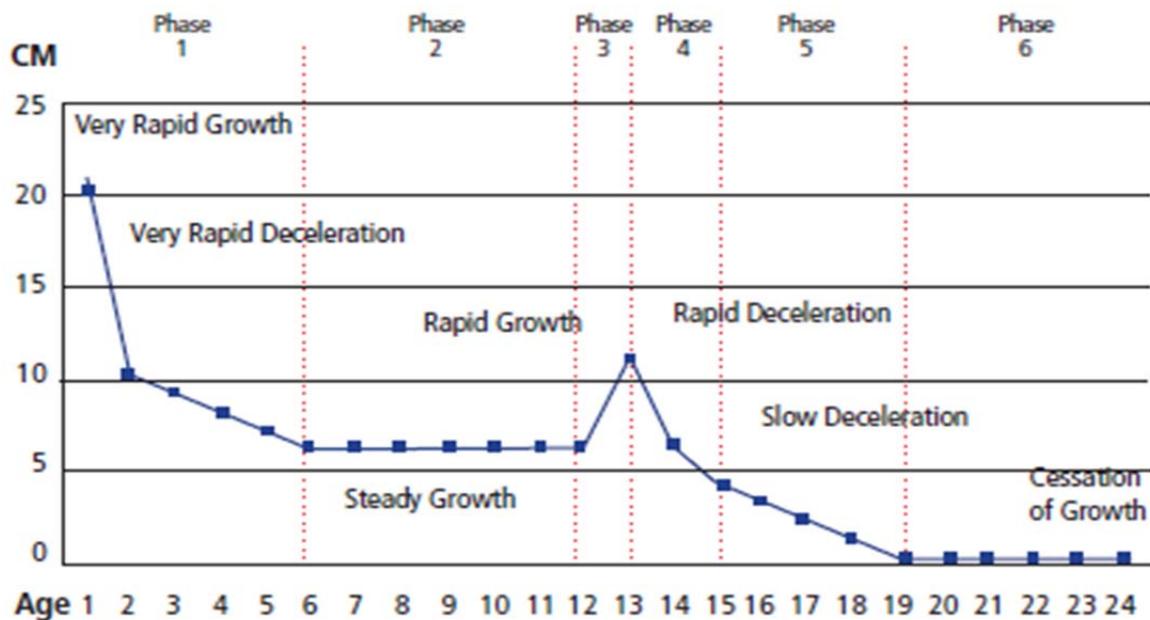
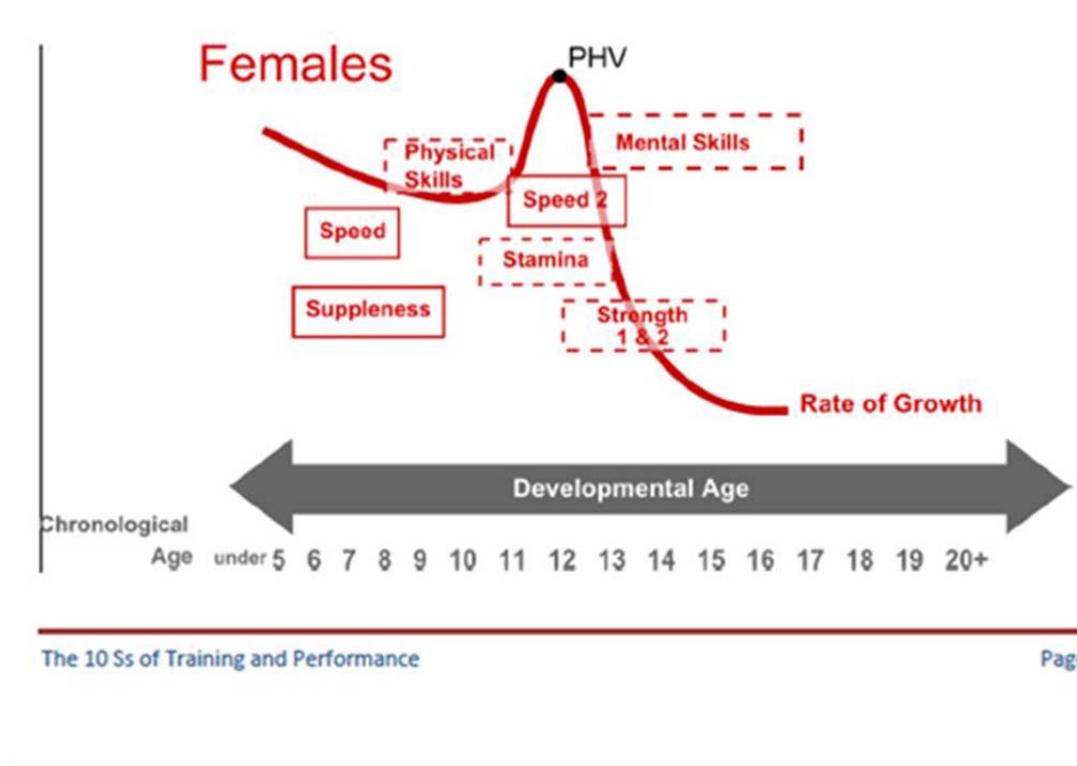


Figure 2: The six phases of growth.
Windows of Optimal Trainability (Balyi and Way, 2005)



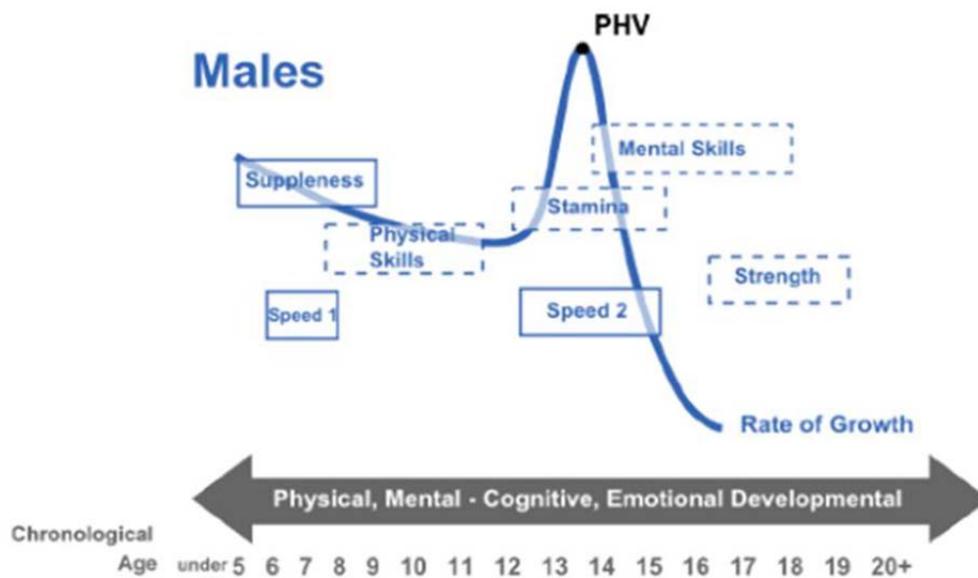


Figure 3: Windows of Accelerated Adaptation to Training (adapted from Balyi and Way, 2005)

Speed

There are two sensitive periods for trainability of speed. During the first speed window, training should focus on developing agility and quickness; during the second speed window, training should focus on developing the anaerobic alactic energy system.

For girls, the first speed training window occurs between the ages of six and eight years and the second window occurs between the ages of 11 and 13 years. For boys, the first speed training window occurs between the ages of seven and nine years and the second window occurs between the ages of 13 and 16 years.

Suppleness (Flexibility)

For both girls and boys, the sensitive period of trainability for suppleness occurs between the ages of six and 10. In addition, special attention should be paid to flexibility during Peak Height Velocity (PHV).

Skill

For girls, the sensitive period for optimal skill training occurs between the ages of eight and 11 years; for boys, it occurs between the ages of nine and 12 years, or more precisely before the adolescent growth spurt. During this window, children should be developing physical literacy; that is, competence in the fundamental movement and sport skills that are the foundation for all sports. Competence in these skills makes it easier for children to learn and excel in late-specialisation sports such as canoeing.

Stamina (Endurance)

The sensitive period of trainability occurs at the onset of PHV, which is the adolescent growth spurt. Athletes should focus on aerobic capacity training as their growth rate accelerates; aerobic power should be introduced progressively after growth rate decelerates. Aerobic capacity and power are crucial for canoeists.

Strength

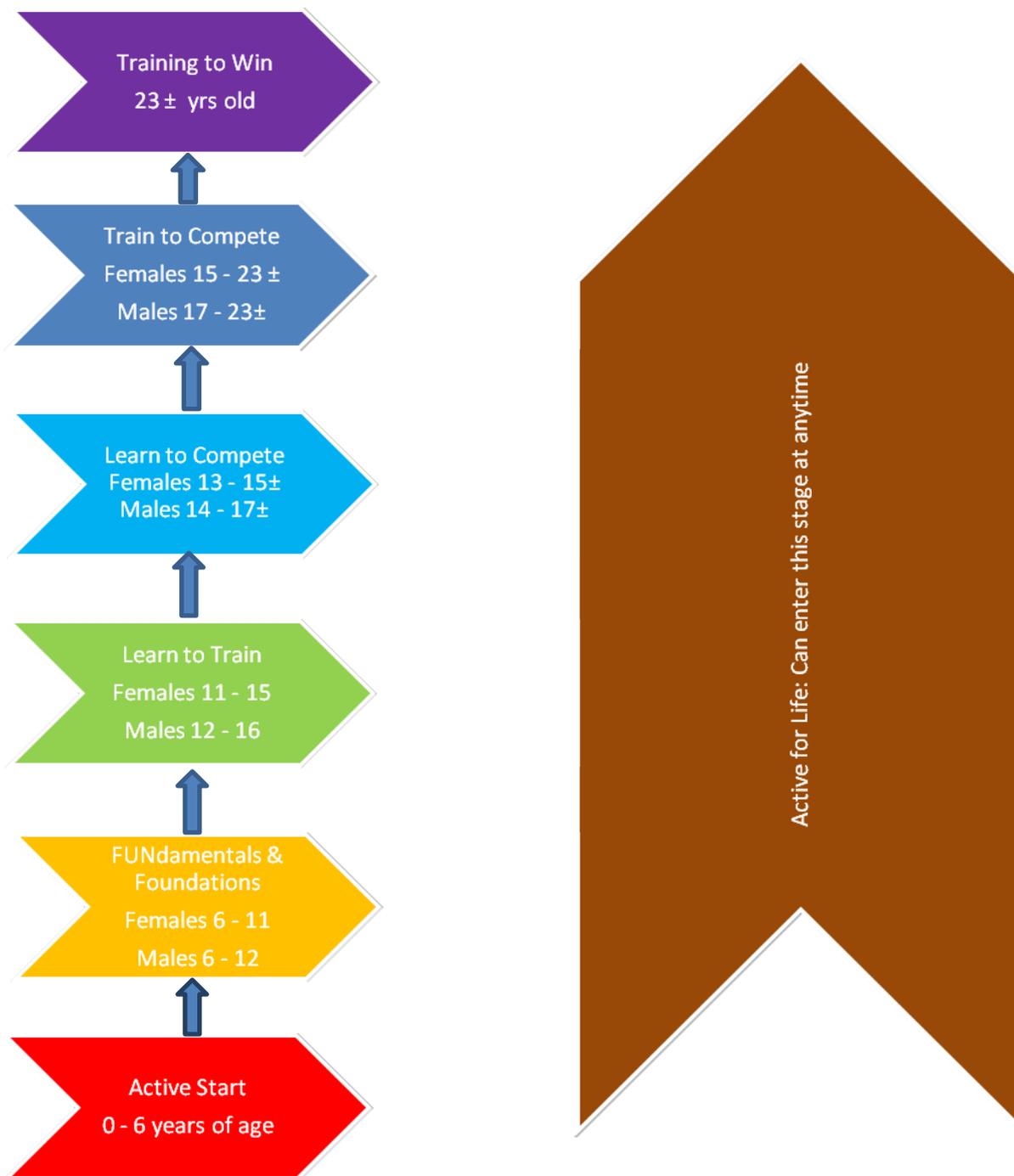
For girls, there are two sensitive period of trainability for strength: the first is immediately after PHV and the second is at the onset of menarche. For boys, there is one strength window and it starts 12 to 18 months after PHV.

Stages of LTAD for Canoe/Kayak

The LTAD framework outlined below describes the optimal development pathway for an athlete who starts paddling between 6 and 12 years of age and continues through to racing successfully at the elite level. The early stages of development will be the same for all paddlers. When the volume of training starts to increase during the Learning to Compete Stage, the pathway of those who choose to compete at a high level will diverge from those who choose to paddle and compete for enjoyment and fitness. Any training, racing, and recovery program should reflect the goals of the paddler for whom it is designed.



Stages of Long-Term Participant Development for Canoeing



Long-Term Participant Development Framework for Canoeing

		Active Start	FUNdamentals & Foundations	Training to Train	Learning to Compete	Training to Compete	Training to Win	Active for Life
AGE	Females	0 - 6	6 to 11	11 to 15	13 to 15±	15 to 23 ±	23 ±	Anytime
	Males		6 to 12	12 to 16	14 to 17 ±	17 to 23 ±		
Phases		Fundamental Movement Skills	Fundamental Sport Skills; Canoeing Skills	Physiological Development	Continued Physiological development; Competitive Development	Competitive development	Performance	Health
Skill Development			basic paddling skills; balance & boat control	Intermediate paddling skills	gross motor refi nement; advanced paddling skills; technique under race conditions	technical refi nement; refi nement of decision making skills	technical maintenance; refi nement of raceplans; performance management	goal specifi c
Traning Focus				General endurance			Improve & maintain strength, speed, endurance & ancillary capacities	Fi tness, fun, well being
Critical Windows of Trainability			Speed 1 Suppleness basic skills					
Volume of Training			3-5 sessions/week; progressing to 4-6 sessions/week	In season: 4-8 sessions/week Off season: 4-6 sessions/week	In season: 8-12 sessions/week Off season: 6-9 sessions/week	9-12sessions/week year round	Individualised	Goal specific
Mental Preparation			Build desire to stay involved; build self confi dence	Develop focus; effective goal setting; breathing & relaxation skills; athlete/coach communication & feedback	Focusing & re-focusing; effective goal setting; assessing training & competition; visualisation, relaxing vs energising	Continually refi ning mental skills; developing correct level of intensity	Attention to detail; managing distractions	
Monitoring			aerobic capacity; agility; fl exibility; height	aerobic capacity; fl exibility; height	aerobic capacity; height; general strenght	aerobic power & capacity; anaerobic power & capacity; sport specifi c strength	aerobic power & capacity; anaerobic power & capacity; sport specifi c strength	General well-being
Races		   						

Active Start

Age: 0-6 years

Objective:

Learn fundamental movements and link them together into play.

Key Outcomes: Fun and Movement skills

Physical activity should be fun and a natural part of every child's daily life. Active play is the way young people are physically active. CSA does not play an active role in this stage other than recommending that children learn to swim, and play in boats with their parents as a part of developing physical literacy.

FUNdamentals, Foundations and Physical Literacy

Ages: Males +/- 6 -12, Females +/- 6 - 11

Objectives:

At the beginning of this stage the objectives are to learn overall sport skills; build water sense and safety awareness; and learn basic boat and paddle handling skills in age appropriate sprint kayaks.

Key Outcomes:

At the end of this stage, children will:

- Be physically literate (competent in fundamental movement skills)
- Possess fundamental kayak skills
- Use the kayak basic boat steering skills in demonstrating boat control
- Paddle continuously in a single and team boat
- Be comfortable and confident in boats, and playing in, on, and around the water
- Be able to swim 25m with a pdf

Children at this age are at the optimal point to learn basic skills; and should therefore be exposed to the introduction and continued learning of the basics (balance, steering, and propulsions) in all types of appropriate kayaks. In addition to this, and to help develop other basic sport skills, as well as coordination and body awareness, children should be enrolled in a variety of sporting activities three to four times per week. This additional participation helps develop physical literacy, which requires a broad base of activities such as athletics, swimming, gymnastics, core stability exercises etc. to develop fully.

Training Focus:

- **Technique:** Athletes at this stage should focus on learning how to balance and properly control all types of kayaks; there is no need at this age to specialise, and by the end of this stage, athletes should be able to set up the body properly in the boat, be able to stay in stroke and be able to properly hold a paddle. Athletes should be able to properly steer a sprint kayak. By the time athletes reach the end of this stage they must have good fundamental kayak skills.
- **Tactical:** In this stage, children should engage in deliberate play and should learn basic decision making skills such as how to dock a boat properly, how to avoid hazards in the water, how to identify environmental hazards, and judging weather conditions for safety reasons. Children should also learn to launch and dock a boat, listen and follow instructions, and learn to paddle in a group. Toward the middle of the stage, athletes should be starting to make decisions on the race course such as properly lining up, starting, and propelling their boat down the course.
- **Equipment:** At this stage of development athletes will require stable boats, but by the end of the stage they should be using an intermediate style racing canoe or kayak. Therefore clubs should have a good progression in boats from very stable to newer style racing boats. Kayakers should

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be using seats, but the seats should sit as low as possible in the boat to maximise stability. As the athlete grows, longer and bigger blades can be used, but not at the expense of good technique. Young children should be exposed to a variety of equipment and introduced to basic boat maintenance. Importantly, throughout this stage children should be taught to be responsible and careful in the use of fragile boats, paddles and other equipment.

- **Coaching:** Coaches will require a good knowledge of growth and development as well as knowledge of the fundamental movement skills and fundamental sport skills that make up physical literacy. They should have the ability to assess physical literacy and make recommendations to the children to improve any gaps. Coaches who are dealing with athletes at the start of this stage should have a Level 1 Assistant Coach Diploma.
- **Training volume:** At the start of this stage, children should be participating in 3-5 sessions per week lasting 30-120 minutes. The session should include a warm up; work on general technical skills; modified games or activities with simple rules and a cool down. Towards the end of this stage they should continue to do 3-5 sessions per week lasting 90-120 minutes with more of an aerobic fitness component included. Nevertheless, kids should be encouraged to 'play around', in, and under boats. Throughout this process they are learning critical paddling skills.
- **Competition:** Regattas should be a half day in length and should be 'fun'. The athletes should compete in stable boats. In addition, coaches should start developing team boat skills and team boat races should be part of all regattas. There should be no national championship regattas in small boats for this age group. Athletes nearing the end of this stage can start competing in head to head style competitions tailored towards their developmental needs. The length of the regatta can then be increased to a one day event and these athletes may race 3-4 times per year in provincial competitions. Once again team boat events should be stressed. Finally, even though the level of competition has increased these regattas should continue to be fun for the athlete and they should be recognised for their achievements by handing out medals or ribbons on a podium at the end of the day.
- **Mental preparation:** The main objective at this level is to create an environment where the children want to paddle, enjoy being on the water, learning early skills on how to paddle. Coaches need to clearly understand the importance of such a social environment and have the skills to create it. They need to be skilled at teaching the basic skills (because even though at this level, the 'athletes' are young, they still will begin to build confidence by 'improving' in the sport). There needs to be a variety in the training, again so the young athletes-to-be want to continue. A key point here is building desire to stay involved and building self-confidence. Some suggestions are kilometre charts or personal improvement recognition, games to foster team play. Also included should be opportunities to develop life skills such as dealing with peer pressure. All of this will create a foundation upon which the coach and the athlete develop a long term productive relationship.
- **Nutrition:** Children at this age should be made aware of proper hydration. They can also be taught about nutrition through analysing the snacks they bring to the Club and be encouraged to make healthy choices. Coaches can also use informal talks to inform athletes and parents on healthy choices. Organisers should be encouraged to provide healthy snacks during regattas.
- **Monitoring:** During this stage many children will start their growth spurt, especially females. This is known as peak height velocity (PHV). Since PHV is used as a marker for many of the sensitive periods of trainability, height should be measured a minimum of 4 times per year. This stage also coincides with the sensitive periods for suppleness and speed 1 (agility); therefore it

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is suggested that a simple flexibility test such as the “Sit and Reach Test” be used to monitor hamstring and low back flexibility; and a shuttle run test to monitor agility. Finally, although endurance is not one of the sensitive periods of trainability listed in this section, it is still a very important measure of general health and wellbeing and can be used as a benchmark for future improvement. CSA suggests using a simple field test such as the Cooper test or the Leger test to measure endurance.

- Safety: CSA recommends a coach to athlete ratio of 1:10. In addition, all children enrolled in these programs should wear life jackets when on the bank or in the water. It is also a requirement that coaches develop a safety plan and are proficient in first aid and CPR.
- Ancillary capacities: By the end of this stage, children and parents should be educated about proper clothing and equipment at practice (hat, water bottle, sunscreen, change of clothing) and they should be aware of how to properly warm-up and cool down for practice and races.

Learn to Train

Ages: Males +/- 12 -16, Females +/- 11 – 15

Objectives:

- Building the physical and mental engine
- Learn to paddle with proper technique
- Develop speed and strength
- Proficiency in paddling singles and crew boats
- Speed

Key Outcomes:

At the end of this stage athletes will have developed

- A strong aerobic base (2km times; 1500m run times; 300m swim times)
- Core strength

CSA suggests that at the start of this stage an information session be held with athletes and parents to highlight and explain the long term training process, equipment needs, training and nutritional requirements, as well as the importance of support and encouragement of the athlete. This stage encompasses many different windows of trainability for both males and females as most athletes will begin, and some may complete PHV during this stage. The first training window will likely be the second speed window for both males (13-16 years) and females (11-13 years). This speed window should focus on the development of anaerobic alactic power and capacity through the use of 0-20 second intervals with lots of rest. The onset of PHV will signal the start of the aerobic capacity window. Athletes at this age should start doing some dry land aerobic training to supplement on-water aerobic training in order to avoid overuse injuries. Finally, the onset of menarche for females will signal the start of strength training window, however since males normally reach their growth spurt after females, males will not likely reach this window during this stage as the onset of the strength window for males is 12-18 months after PHV.

Training Focus:

- Technical: By the end of this stage of development, athletes should be getting into more advanced technique and be competent in all racing craft. Athletes should also be able to adapt their technique to accommodate varying race conditions. Coaches are advised to assess balance frequently and make sure the athletes are using the proper equipment. Advancing an

athlete too quickly into a more advanced racing boat will result in poor balance making it more difficult for the athlete to master technique.

- **Tactical:** During this stage athletes should be introduced to the various aspects of racing such as pacing, assessing stroke rate, and wash riding for long distance competitions without the help of a coach. They should also be introduced to race plans for the various distances and practicing their race preparation warm-up plans.
- **Equipment:** Boat progression should correlate with balance and maturation; athletes should be mastering their technical skills in stable boats before they progress into competitive racing boats. Athletes should also be responsible for their equipment and know how to properly take care of it.
- **Coaching:** Coaches who are instructing at this stage should be minimum Level 1 certified and continue with on-going professional development. All coaches working with athletes at this stage of development should have a thorough knowledge of the growth and maturation stages (physical literacy). The coach will be acting as a teacher, a leader and a facilitator to athletes and parents.
- **Training volume:** As mentioned above there are up to 3 sensitive training periods that occur during this stage (speed #2, aerobic capacity, and strength). Each of these windows should be emphasized at the appropriate time during this phase, in addition to the other training components. CSA recommends that during the paddling season athletes in this stage should be training a minimum of 4-8 times per week on water and each session should consist of 60-90 minutes of activity (structured and unstructured). Since this stage is crucial for the development of the aerobic system, dry land training can be introduced as well to supplement on water training. It is important to note that 4 sessions has been chosen as the minimum because anything less than that is simply maintenance work. During the off season, athletes at the start of this stage should be participating in other complimentary sporting activities (swimming, cross-country running, and gymnastics to name a few), but at the same time Clubs should offer 1-4 session per week of kayak specific training so they do not lose touch with their athletes. By the end of this stage athletes should be moving more and more into sport specific training and Clubs should offer 4-6 training sessions per week during the off-season
- **Competition:** Athletes at the beginning of this stage are ready to participate in formal competitions. This stage reflects the speed window and the aerobic capacity window therefore, competition should reflect these windows. It is important for the development of the athlete that they race both short and long distance races. As athletes progress through this stage they should start being exposed to increasingly competitive style regattas. Athletes nearing the end of this stage should be competing at the SA Schools Championships. CSA recommends that the athlete only compete in one major competition per season and one minor competition per month. This is not to say that athletes should only go to one regatta per month, but rather that local Club or provincial regattas should tailor their race cards to emphasise skill development instead of traditional head to head races
- **Mental preparation:** This age group is ready to learn what to focus on and how to develop that skill. In doing this, they will begin to understand/can be taught that what they think and feel affects their performance; and, how to develop 'control' over those thoughts and feelings. They can also learn how to set effective goals at a number of different levels; outcome, performance, process, and its relationship to the skill of focus. In addition, athletes should be introduced to

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breathing and relaxations skills. Finally, it could also be appropriate to begin to teach the athletes how to communicate effectively with their coach (es) and how to ask for feedback.

- **Nutrition:** In addition to proper hydration and food choices, athletes in this stage should be aware of proper pre-race and race day foods as well as the timing of snacks and meals throughout the day in relation to practices and races.
- **Monitoring:** Almost all children will have reached their growth spurt during this stage, therefore it is very important to measure height at least four times per year to monitor PHV. In addition, rapid growth generally results in losses in flexibility, so the "Sit and Reach Test" should also be employed here to monitor hamstring and lower back flexibility. Finally, during this stage athletes should be working on general endurance, so the 'Cooper test' or the 'Leger test' can also be used as a means to monitor endurance during this stage.
- **Safety:** The volume of training is increasing at this stage, therefore athletes should be introduced to basic injury prevention ideas such as stretching (when and how), and various recovery techniques (stretching and ice).
- **Ancillary capacities:** At this stage of development athletes should be responsible for doing a proper warm-up and cool down as part of their practice and should be developing warm-up routines for race day. Towards the end of this stage they should be introduced to the concept of tapering, but a shorter taper should be used to avoid detraining. Athletes should also be aware of the importance of proper nutrition for training and on race day.

Learn to Compete

Ages: Males +/- 14 -17, Females +/- 13 – 15

Objectives:

- Refine and consolidate paddling skills
- Learn to race
- Develop sports specific endurance, strength, speed and skills for racing

Key Outcomes:

At the end of this stage athletes will have developed:

- Proficiency in single, doubles and fours under a variety of conditions
- Confidence in a variety of regatta and race situations
- Good decision making skills with regards to all aspects of training and boat handling
- Appropriate and measurable improvements of sport specific endurance, strength and speed

This is a critical stage where biological maturation has a strong influence on training and it is essential to measure PHV to determine when the various training windows occur. The second speed window for girls will occur at the beginning of this stage between the ages of 11 and 13, and the same window for boys occurs between the ages of 13 and 16. The aerobic capacity window occurs with the onset of PHV for both sexes and the strength window occur with the onset of menarche for females and 12-18 months after PHV for boys.

Training Focus:

- **Technical:** At this stage the athletes should be looking to improve and understand their technique through kinaesthetic sensation (feel) and a variety of feedback from the coach. It is

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essential that the athlete's good technique transfers to the boat in terms of good boat propulsion. The athlete should also learn to transfer their technique to racing.

- **Tactical:** Athletes should experiment with race plans and pacing strategies for all distances.
- **Equipment:** By the end of this stage athletes should have their own personal equipment; singles and paddles. At the end of this stage athletes should be able to paddle in the most current shapes of racing singles, doubles and fours; use of the ultimate technology of paddles. Athletes should be able to adjust equipment to personal settings.
- **Coaching:** Coaches training athletes at this stage should be Level 1 certified and mentored by a Level 2 coach or tutor. They should also consider carry on with coaching education, and consider taking various professional development courses.
- **Training volume:** Athletes at this stage should be specialised in kayaking and this should be their main sport focus throughout the on season. During the competitive season these athletes need to be doing 8-12 session per week. During the general preparation period these athletes should be doing 6-9 kayak specific training sessions per week of 60-90 minutes each. By the end of this stage, athletes should be introduced to training camp environments. Athletes should be introduced to heart rate versus effort, heart rate versus speed, and their relation to stroke rate.
- **Competition:** Athletes in this stage should be competing in 4-7 events per season. Half the events should be designed as traditional regattas where crews can practice and perfect their race plans for the major competitions. One of the regatta's should be a crew boat only regatta that focus on the development of crew boat skills and two regattas should be long distance to emphasize the aerobic capacity window that occurs in this stage. Athletes in this stage are ready to compete in two major regattas per year, one being the National Championships and the other the South African Schools Championships. After the competitive season there should be an active recovery period lasting a minimum of two weeks.
- **Mental preparation:** During this stage all the psychological skills need to be taught/learned; what to focus on and how to train it; how to re-focus if you lose it; how to set various goals (process, performance, outcome; and how/why each are important, but how they can also be stressors); understanding and learning how to relax for sleep, and within a competition; how to energise and how to recognise when it is necessary; how to set up effective plans for training and for competition; how to assess each of the above skills on a regular basis (after competitions, at the end of the year); how to visualise effectively (not an easy skill for many athletes), and how to establish life balance. The order in teaching and learning of these skills will depend, to a degree, on the athlete's needs.
- **Nutrition:** Athletes will refine nutritional skills and strategies which include pre and post training and racing. These strategies should also include hydration plans for during and after exercise to counter the effects of dehydration. These strategies will lead to greater self-analysis and awareness of food choices and can be complemented by bringing in professionals to a group setting.
- **Monitoring:** As in previous stages, height should be monitored four times per year in this stage to monitor PHV. In addition, this stage corresponds to the aerobic capacity window, thus a general field test for aerobic power and capacity should be used such as the Leger Test or the

Cooper Test. This stage also corresponds with the strength window, thus a general strength test should be used to monitor progress.

- Safety: The athlete should be fully aware of the safety requirements of the sport including appropriate equipment and procedures for all kinds of weather conditions.
- Ancillary capacities: By the end of this stage athletes should not only be doing proper warm-ups and cool downs, but should also know the reason why they are doing these things. Initiate learning the basics of health and wellness and be responsible for injury prevention and rehab.

Train to Compete

Ages: Males +/- 17 - 23, Females +/- 15 – 23

Objectives:

- Further develop and refine sport specific endurance, speed, strength and skills for racing in Olympic distances
- Further develop and refine racing skills including mental preparation, race strategies, and ability to handle a variety of conditions and situations

Key Outcomes:

At the end of this stage athletes will:

- Race well under a variety of conditions, maintaining good technique under pressure and fatigue
- Be empowered to understand their role in critical thinking and decision making for their, training, performance, equipment, schooling, and social life under the guidance of their coach.
- Manage their lifestyle to meet training commitments

Athletes in this stage have completed all the objectives and outcomes from the previous stage and are ready to train at a national team level. Yet if necessary there should be opportunities for the athlete to receive remedial support in deficient areas. Athletes are working with their Club coach, Provincial coach, and National team coach. Athletes in this stage are often on the national team and working towards performing at a world class level.

Training focus:

- Technique: Maintain and refine trained technique as individualised progression continues. Athlete now learns to transfer technique to racing.
- Tactics: Athlete learns a variety of tactics and strategies in training that are applied during competition. Athlete is trained to critically think and make appropriate decisions in utilising required tactics during competition. Coach and athlete identify tactical deficiencies and are implementing the required adjustments.
- Equipment: All equipment at this point should be personalised and meets international standards.

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- **Coaching:** At this stage the coach athlete relationship is more of a partnership. Coaches at this level should be Level 2 certified and should be mentored by a Level 3 coach or tutor. Coaches should be participating in on-going professional development workshops.
- **Training:** As athletes move through this stage they should be participating in an increased number of centralised training camps. Training should be designed and implemented by the Provincial coach. The National coach should be establishing guidelines and monitoring technical, tactical, physiological and psychological expectations for the respective national team athletes.
- **Competition:** As athletes develop through this stage, they are training to compete at the SA championships, National Team Trials, Junior World Championships and international competitions associated with the national under 23 programs. To reflect their personal development within this stage, the coach and athlete select the appropriate number of minor competitions for “Modelling” their race plans in order to have the best possible performances during major competitions. Toward the end of this stage, athletes should be participating in 2-3 major competitions per year which includes National Team Trials and international competitions.
- **Mental preparation:** By this stage, hopefully the athlete has developed all the skills mentioned in the learn to compete stage, and now he/she should be continually refining these skills and developing the 'correct level of intensity' for the demands of the sport.
- **Nutrition:** Athletes should be working with a nutritionist to identify any deficiencies and make the required adjustments.
- **Monitoring:** Athletes in this stage require more specialised monitoring due to the higher physical demands associated with higher levels of training. Athletes should be receiving annual physicals and regular blood analysis as part of the monitoring process outlined by our centre of specialisation. Athletes should be receiving sport specific aerobic power and capacity as well as anaerobic power and capacity tests as part of the monitoring process throughout the year. Sport specific strength testing should be done as part of the yearly testing outlined by our centre of specialisation. The results of the testing should be used to make individualised training recommendations for each athlete to help improve performance.
- **Safety:** The athlete should be fully aware of the safety requirements of the sport including appropriate equipment and procedures for all kinds of weather conditions.
- **Ancillary capacities:** Identify any deficiencies and make the required adjustments.

Train to Win

Age ± 23 years old

Objectives:

- Refine individual training, technique and racing skills so athletes have the greatest potential to win.
- Maintain or where possible, improve technical, physical, racing and ancillary capacities

Key Outcomes:

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At the end of this stage athletes will produce:

- Podium performances by winning medals at World Cups, World Championships and Olympic Games
- Athletes will continue to race consistently at the podium level for more than one quadrennial cycle

Athletes at this stage are elite squad members at the peak of their careers who have previous experience in World champs or Olympic finals. They are working closely with their personal coach, national team coach, and High Performance team. All relevant performance capacities have been met and training programs are refined to address their individual strengths and weaknesses. Most athletes will not medal until the end of this stage.

Training focus:

- **Technique:** Refine and reinforce technical excellence.
- **Tactics:** Identify competition strategies to ensure the greatest potential for podium performances. This includes refinements to race plans, and performance management.
- **Equipment:** Athletes and CSA should be working with equipment manufacturers to customise equipment for optimal performance.
- **Coaching:** At this stage the coach athlete relationship is more of a partnership in conjunction with the national team coach. Coaches are Level 3 certified and participating in on-going professional development workshops.
- **Training:** Athletes in this stage have made a full time commitment to year round training. Athletes are involved in national team training camps scheduled throughout the year. Off season and “at home” training periods should be designed by the athlete’s personal coach in consultation with the national coach. The National coaches should be establishing technical, tactical physiological and psychological expectations for the respective elite squad athletes.
- **Competition:** The competition schedule for train to win athletes should be constructed with the goal of achieving optimal performance at World Cups, World Championships and Olympic Games. This means scheduling an appropriate number of selection and international competitions as a lead-up to the major competition.
- **Mental preparation:** Attention to detail in the training and performance environment by the athlete the coach and the team (managing distractions).
- **Nutrition:** Athletes, coaches and the High performance team should be working with a nutritionist to identify any deficiencies and make the required adjustments.
- **Monitoring:** Athletes in this stage require more specialised monitoring due to the higher physical demands associated with the higher levels of training. Athletes should be receiving annual physicals and regular blood work as part of the monitoring process outlined by our centre of specialisation. In addition, athletes should be receiving sport specific aerobic power and capacity as well as anaerobic power and capacity tests as part of the monitoring process throughout the year. Sport specific strength testing should also be done as part of the yearly testing outlined by our centre of specialisation and High performance team. The results of the testing should be used to make individualised training recommendations for each athlete to help improve performance.

- Safety: The inherent dangers of injury during international competition should be highlighted and planned for.
- Ancillary capacities: Identify any deficiencies and make the required adjustments. Communication is critical between the athlete and the High performance team. Athletes are considered as leaders at this stage.

Active for Life

Age: Any age

Objectives:

- Continue to be physically active in paddling and/or other sports and activities
- Continue to be involved in the paddling community, as an athlete, coach, officials or in other capacities.

Key Outcomes:

- Health, well-being, and fun

The goal of this stage is to keep paddlers involved in the sport for life. Some people enter this stage from the competitive scene, while others may never have been competitive paddlers and just enjoy the recreational and fitness aspects of this sport. Regardless, athletes in this stage are valuable to Clubs, to act as coaches, and to be volunteers. Paddlers in this stage should be recognised as athletes and as leaders and resources for our sport.

Training focus:

- Technique: Develop or refine technique based on individualised goals.
- Tactics: Develop or refine tactics based on individualised goals.
- Equipment: Equipment should be matched to athlete's ability level and goals. Beginner athletes should use beginner equipment and more advanced athletes can progress into racing style boats and personalised equipment.
- Coaching: At this stage the coaches should be Level 1 & 2 certified and able to communicate effectively with an adult population. In general, the coach will act as a teacher and an advisor to the athletes.
- Training: Training at this stage should be adapted to the athlete's individual goals. Consideration should be given for the athlete's age and past sporting experience when prescribing exercise.
- Competition: Athletes at this stage should compete in skill appropriate regattas locally and internationally.
- Mental preparation: Athletes should be encouraged to enjoy the benefits of physical activity and a healthy lifestyle.

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- Nutrition: Athletes should be following the guidelines set out in the Food-Based Dietary Guidelines for South Africa.
- Monitoring: It is suggested that athletes at this stage consult their physician before starting a new physical activity program. In addition, Clubs should be encouraged to do some kind of pre-screening before prescribing exercise to this population.
- Safety: Athletes should be made aware that there are inherent dangers associated with all sport, and it is everyone's responsibility to minimise those dangers. Swimming ability should be assessed and PFD's should be worn by those who are not competent swimmers.
- Ancillary capacities: Many athletes in this category may be new to physical activity therefore; they should be instructed about the benefits of regular physical activity, proper warm-up and cool down, stretching, proper hydration, and proper nutrition.

Practical Implications

In order to establish the practical implications of rolling out a LTPD program a brief SWOT analysis was undertaken, this focused on participants, coaches, parents, and administration. The following summary highlights some of the core issues uncovered by this process.

Participants

- For an unofficial school sport we have a reasonable amount of young participants coming into the sprinting system, however due to the lack of physical education in the school system many of these participants have poor movement abilities, lack proper fitness, and have poor skill development making it a challenge for coaches to teach the complex skills required for a late specialisation sport such as sprint kayaking.
- Children are expected to start competing at the U8 level which often leads to burnout by U23, linked to this is that;
- Adult training and competition programs are imposed on young athletes.
- Many of the top performers are drawn away from sprint kayaking to the other disciplines such as Marathon, river and surfski racing due to financial rewards and media exposure.
- Athlete preparation is geared to the short-term outcome — winning — and not to the process.
- Chronological rather than developmental age is used in training and competition planning.
- Coaches largely neglect the critical periods of accelerated adaptation to training

Coaches

- Currently we have no Elite sprint coaches employed by the Federation, and our pool of experienced sprint coaches is small.
- In the Provincial coaching system we have 1 full time coach while in the other provinces the club coaches receive a small monthly stipend.
- The coaches are not solely focused on sprint kayaking but on training athletes for all the other disciplines (rivers, marathon, and ski), so coaching varies throughout the year depending on which competition is next.
- There are limited educational opportunities for sprint coaches to move up to a higher coaching level.

Parents

- Are not educated about LTPD and the complexities around sprint kayak training

Administration

- Currently there is no official talent identification (TID) system in place geared towards sprint kayaking.
- There is no integration between physical education programs in the schools, club sprint kayak programs, and the elite competitive programs.
- More importantly there is no systematic development of the next generation of successful international sprint athletes.

From the above analysis it is clear that LTPD has practical implications for parents, coaches, Clubs, the racing calendar, equipment, as well as for the optimal age for learning to paddle and the optimal way of learning to paddle. Together, the paddling community must build the environment that will allow LTPD to be effective. In most cases, this will demand a change in the way of thinking about athlete development; while in others it will provide support and further impetus to those coaches who have already adopted the principles of long term development of athletes.

- **Clubs:** Clubs are the backbone of canoeing in South Africa and will need to practically apply the various LTPD stages at the grassroots level. Many clubs are already offering opportunities for participation in canoeing as well as coaching throughout the different levels of competition; however this LTPD plan will allow them to formalise these offerings and provide a clearer path for development.
- **Parents:** LTPD will provide a framework for parents to understand physical literacy and its importance for a healthy lifestyle and for success in competitive sport. It will help parents to understand physical, mental, cognitive, and emotional development and how these affect participation, training, and performance. LTPD will also help parents to understand the particular hydration, nutrition, and recovery requirements of growing children.
- **Equipment:** Clubs will need to provide appropriately sized boats and equipment for athletes as they move through the fundamentals and foundations stage. Smaller athletes will require smaller boats and paddles of the appropriate length and blade size. Paddles length should be based on the athletes sitting height and arm span, and refined based on the coaches observations on the water.
- **Racing Calendar:** Much of the literature on LTPD suggests that children in the Fundamentals and Foundations stage and in the Learn to Train stage, over compete and under train. Generally, in canoeing the younger athletes train throughout the week and compete on a regular basis throughout the season. CSA supports this however we would like to see the nature of the competition be adjusted to reduce head to head winner takes all races and increase the number of events focused on skill development. In addition, the duration of events should match the physiological “windows of trainability”. This is not to say that only events of certain duration will be raced in each “window”; it means that more emphasis would be put on events which capitalise on the “window”.
- **Coaches:** All CSA paddlers need to have better canoeing technical skills at all levels, and this will require more expert skilled coaches at all levels. CSA will need to align its coach’s education with the needs and requirements of the LTPD plan, as well as with the South Africa Coaching Framework for sport. CSA will also need to offer more opportunities for coaches to up skill through on-going professional development sessions. At a club and provincial level unions should be developing ways to ensure coaches are available at all clubs and that they are skilled appropriately.

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- Other sports: as the sensitive periods of trainability for speed (first window), and suppleness, and part of the skill window occur before most children start paddling. We will need to establish a greater presence in school physical education programs so as to ensure that children are being exposed to the correct training and opportunities to develop the appropriate physical literacy.

Implementation: Phase 1

The first stage of our implementation plan is to prioritise the education of our athletes, coaches, parents, and administrators on the theories and principles of LTPD and to then make any further adjustments to our plan to ensure Federation, Union and club buy in. Included in this first phases should be a full review of the current competition season to ensure it complements the goals of LTPD going forward.

Conclusion

This document is the first step in developing LTPD for Canoeing South Africa. It provides an overview of LTPD, defines the principles on which LTPD is based, outlines each of the stages and their key aims and objectives, while touching briefly on some of the practical implications for canoeing in South Africa. We believe that by adopting and making LTPD an integral part of South African canoeing we will ensure our future international success, grow our pool of potential athletes, and keep our participants involved for their sporting lives.

Canoeing South Africa would like to acknowledge Canoe Kayak Canada and their Long Term Athlete Development Plan as a contributing source of information in the compilation of this LTPD framework.

Glossary of Terms

- ABC's: Agility, balance, coordination and speed
- Ancillary capacities, refer to the knowledge and experience base of a player and includes warm-up and cool-down procedures, stretching, nutrition, hydration, rest, recovery, restoration, regeneration, mental preparation, and taper and peak.
- The more knowledgeable players are about these training and performance factors, the more they can enhance their training and performance levels. When athletes reach their genetic potential physiologically cannot improve anymore, performance can be improved by using the ancillary capacities to full advantage.
- CPK's: catching, passing, kicking and striking with a body part
- KGB's: Kinaesthetic sense, gliding, buoyancy, striking with an implement
- Major competition: Any competition that is the main focus of training for the year. The major competition may change depending on which developmental stage the athlete is in and usually involves peaking.
- Minor competition: Smaller competitions where athletes can practice their race plans and race day routines against most of the top competitors in their discipline. Usually involves some rest and or taper before the competition, but does not involve a major peak.
- Lead in competition: Small competition where athletes can practice their race plans and race day routines.
- Ancillary capacities: All the various other factors that can play a role in athlete preparation (warm-up, cool down, stretching, social, taper, nutrition).
- Modelling: practicing race plans and competition scenarios
- Peak Height Velocity (PHV): The maximum rate of growth in stature during the growth spurt. The age of maximum velocity of growth is called the age at PHV.

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