



Boccia

For All Ages & Abilities

Playing for the Long Term



LONG TERM ATHLETE DEVELOPMENT MODEL

It has taken more than two years to produce this document. The Canadian Cerebral Palsy Sport Association is a small National Sport Organization whose mandate is the Paralympic sport of boccia. Yet we are large in enthusiasm, energy and ideas. We are also blessed with volunteers and staff who were willing to commit to an undertaking of this magnitude. Probably the most difficult decision that we had to make at the very beginning was to decide what the purpose of this document was to be. Was it an athlete development plan based on today's realities or was it a plan which outlined a path for the future? In the end we tried to do both and this plan should be understood as such. We are a young sport organization and serve a defined community. We are proud of what has been achieved so far and are excited about where we can go in future.

There are many to thank. The committee consisted of ten individuals who served as valuable writers, critics and encouragers. Individually they were responsible for specific tasks. John Cumberbirch was responsible for much of the work and philosophy regarding the early stages. He helped us understand what children with severe disabilities really face in their first eight to ten years. It is sobering to understand the degree of medical intervention that is necessary and the effort that the medical community makes for these children. Debbie Kabush, who lived the early stages as a mother of a severely disabled child gave us insight into parenting a child with cerebral palsy and the commitment necessary. Debbie helped us understand the priorities in the lives of these children.

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Mario Delisle and Monique Camirand provided most of the leadership related to the latter stages of athlete development. As National coaches they understand the skills and dedication needed to become an elite

boccia player from provincial to national to international level.

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Dominique Tremblay and Jennifer Larson kept the project moving. As CCPSA staff they spent endless hours doing editing and layout. Both of these individuals also contributed their experience relative to boccia and leading boccia programs.

We cannot forget the contribution made by Colin Higgs, our LTAD consultant. He kept us on target and constantly reminded us of the purpose and function of this document. Vanessa Greebe, who formally edited the document brought it to life. I also thank Angela Dawson, our Sport Canada consultant, whose constant interest and encouragement motivates us all to do better things for sport.



Executive Director
CCPSA

Introduction

What is Long Term Athlete Development (LTAD)?

The Canadian Cerebral Palsy Sports Association (CCPSA) is one of 55-plus Canadian National Sport Organizations (NSO) to develop a Long Term Athlete Development (LTAD) model for their respective sports. **LTAD is not one specific project or program but a philosophy that, when adopted, permeates every program and activity of our sport.**

The Canadian model of 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. Athletes who

progress through LTAD experience training and competition in programs that consider both their biological and training ages in creating periodized plans specific to their development needs.

LTAD focuses on the general framework of athlete development with special reference to growth, maturation and development, trainability, and sport system alignment and integration. It incorporates information from a number of sources. It draws on the experiences of various athlete development projects that have been implemented by different sport organizations in British Columbia since the mid-1990s. It also draws from LTAD work with NSOs including Basketball Canada, the Canadian Curling Association, Speed Skating Canada, the Canadian Alpine Ski Team, and the Report of the Minister of State's (Sport) Work Group on Sport for Persons with a Disability (2004).

Executive Summary

The Canadian Cerebral Palsy Sport Association established an expert committee to apply the principles and stages of LTAD to the sport of boccia.

The committee undertook research that included a survey of current players, three focus group meetings with representatives of three provincial affiliates and researched literature for data in relation to growth and development, fitness and technical/biomechanical issues.

Their work and research quickly identified that the current state of boccia in Canada is very different than the model outlined in “Canadian Sport for Life”¹, the blueprint document for the Long Term Athlete Development model in Canada. (These key issues are explained in more detail in appendix C.)

The decision was made that the LTAD model for boccia would reflect the present reality but, at the same time would clearly demonstrate the philosophical position that reflected the goal of early participation. The LTAD would describe benchmarks and critical windows that do not currently exist.

The Long Term Athlete Development Stages for boccia would reflect what would be needed in future in terms of practice per week/year and length of time needed for international development. As noted above, the LTAD for boccia needed to straddle the present reality while at the same time outlining new goals for the future.

The Committee recognized that athlete development for boccia was tied very strongly to recreational clubs and that it would have to work closely with the provinces and regional clubs to keep a strong recreational/participant component while at the same time work within the same organizational structure to inspire and develop well skilled competitive athletes.

“Boccia for all ages & all abilities” has taken the seven LTAD stages and applied them to the sport outlining what's happening, objectives and key outcomes at every stage to assist athletes, parents and coaches as they grow in the sport of Boccia. Further concepts such as trainability, the five S's and 10 key LTAD factors are introduced.

¹ *Balyi, Istvan; Charles Cardinal; Colin Higgs; Steve Norris; Richard Way. Canadian Sport for Life, (Victoria, BC: Canadian Sport Centres, 2005)*



Letter from Executive Director.....	1
Introduction: What is LTAD?	2
Executive Summary	2
Table of Content.....	3
Glossary of Terms	4
The Sport of Boccia	6
Practical Implications of LTAD on Boccia	7
Research: Current Player Survey and Provincial Issues.....	9
Top 10 Key Factors Influencing LTAD for Boccia.....	10
Key Concepts in LTAD	13
LTAD Stage: Active Awareness	15
LTAD Stage: Learning to Train	19
LTAD Stage: Training to Train	22
LTAD Stage: Training to Compete	25
LTAD Stage: Learning to Win	27
LTAD Stage: Training to Win	30
LTAD Stage: Active for Life	33
Implementation	35
Acknowledgments.....	35
References	36
Appendix A: Boccia Skill Chart	38
Appendix B: Ancillary Skill Chart	40
Appendix C: Physical, Mental and Cognitive, and Emotional Development Characteristics.....	41
Appendix D: LTAD & Boccia Key issues.....	49

Glossary of Terms

Acquire refers to having a grasp of the basics of a particular skill. For the purposes of the boccia LTAD model, skills are considered to be acquired, consolidated and refined, in that order.

Adaptation refers to a response to a stimulus or a series of stimuli that induces functional and/or morphological changes in the organism. Naturally, 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 a difficult period to define in terms of the time of its onset and termination. During this period, most bodily systems become adult both structurally and functionally. Structurally, adolescence begins with acceleration in the rate of growth in stature, which marks the onset of the adolescent growth spurt. The rate of statural growth reaches a peak, 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 overt physical changes and terminates with the attainment of mature reproductive function.

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, mental preparation, and taper and peak. 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.

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 preschool children aged 1 to 5 years, and late childhood, which includes elementary school-age children, aged 6 through to the onset of adolescence.

Chronological age refers to “the number of years and days elapsed since birth.” Growth, development, and maturation operate in a time framework; that is, the child's chronological age. Children of the same chronological age can differ by several years in their level of biological maturation. The integrated nature of growth and maturation is achieved by the interaction of genes, hormones, nutrients, and the physical and psychosocial environments in which the individual lives. This complex interaction regulates the child's growth, neuromuscular maturation, sexual maturation, and general physical metamorphosis during the first 2 decades of life.

Consolidate refers to an athlete moving beyond knowing the basics of a skill to working on reinforcement of the skill. For the purposes of the boccia LTAD model, skills are considered to be acquired, consolidated and refined, in that order.

Critical periods of development refers to a point in the development of a specific behaviour when experience or training has an optimal effect on development. In this document, these periods are also called 'optimal training windows'. The same experience, introduced at an earlier or later time, has no effect on or retards later skill acquisition.

Development refers to “the interrelationship between growth and maturation in relation to the passage of time. The concept of development also includes the social, emotional, intellectual, and motor realms of the child.” The terms “**growth**” and “**maturation**” are often used together and sometimes synonymously. However, each refers to specific biological activities. (See definition of growth and maturation for more information)

Growth refers to “observable, step-by-step, measurable changes in body size such as height, weight, and percentage of body fat.”



Maturation refers to “qualitative system changes, both structural and functional in nature, in the organism's progress toward maturity; for example, the change of cartilage to bone in the skeleton.”

Optimal training window

See 'Critical periods of development'.

Peak height velocity (PHV) is the maximum rate of growth in stature during growth spurt. The age of maximum velocity of growth is called the age at PHV.

Peak strength velocity (PSV) is the maximum rate of increase in strength during growth spurt. The age of maximum increase in strength is called the age at PSV.

Peak weight velocity (PWV) is the maximum rate of increase in weight during growth spurt. The age of maximum increase in weight is called the age at PWV.

Physical literacy refers to the mastering of fundamental motor skills and fundamental sport skills.

Post-natal growth is commonly, although sometimes arbitrarily, divided into 3 or 4 age periods, including infancy, childhood, adolescence, and puberty.

Puberty refers to the point at which an individual is sexually mature and 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 critical 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 power.

Refine refers to perfecting the fine details of a skill that has already been acquired and consolidated. For the purposes of the boccia LTAD model, skills are considered to be acquired, consolidated and refined, in that order.

¹ Malina, R.M. and Bouchard, C. (1991).

Skeletal age refers to the maturity of the skeleton determined by the degree of ossification of the bone structure. It is a measure of age 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.

Specialization

Sports can be classified as either early or late specialization. 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 others are late specialization sports.

Trainability refers to the genetic endowment of athletes as they respond individually to specific stimuli and adapt to it accordingly. Malina and Bouchard (1991)¹ defined trainability as “the responsiveness of developing individuals at different stages of growth and maturation to the training stimulus.”

The sport of boccia

The game of boccia was adopted from the ancient Italian game of bocce. The sport originated in the early 1980's when Europeans realized that there were few if any sports that people with more severe disabilities could play.

The Canadian Cerebral Palsy Sports Association, which is recognized by Sport Canada as the National Sport Organization for boccia, was established in 1985.

The athletes participating in boccia are perhaps the most disabled athletes within the Paralympic family and yet the sport requires a high degree of accuracy, muscle control, and tactics. Boccia players throw or roll balls within a 'court'. The goal is to have their ball rest closest to the 'jack' ball, also known as the target ball or white ball.

While boccia can be played by anyone, it is particularly beneficial for people with severe cerebral palsy or other disability such as muscular dystrophy, quadriplegia or multiple sclerosis. Most athletes use electric wheelchairs and require assistance with the activities of daily living. A number need sport assistants during the game in order to hold the chutes needed to roll the boccia balls out on the court. Almost all of these athletes are born with a disability; it is rarely acquired later in life. Although there have been significant changes over the last few years, most boccia players undergo extensive medical and therapeutic interventions during childhood.

For more information, visit www.ccpa.ca.

“Growing up, I was always active in sports and had the dream of representing Canada at the Paralympics. The fun and competitiveness of boccia is what drives me. It has given me confidence not only in sport, but in life.”

- Tammy McLeod, two-time Paralympian



Adopting LTAD to the sport of boccia has practical implications for athletes, assistants, parents, coaches, sports assistants, clubs, provincial sport organizations (PSOs), and the competition system when it comes to the optimal age for and way of exposing children with cerebral palsy and related disabilities to boccia. We must challenge ourselves and others to understand and respect the skills involved in being an elite boccia athlete.

We must build a community that allows the LTAD model to work. In some cases this will demand a change in the way of thinking about boccia; in some cases this way of thinking supports and provides further momentum to PSOs and to coaches who are already implementing changes based on these principles.

LTAD Implications on Provincial Sport Organizations (PSOs) and Community Clubs

CCPSA does not directly reach boccia players until they reach the Learning to Win and Training to Win Stages. As such, PSOs and community boccia clubs will be the leaders in implementing the principles of LTAD in the important early stages. In the provinces without PSOs, it is up to CCPSA to take the lead and foster provincial development in a way that is consistent with LTAD.

The ideal age of new boccia players identified in this document is significantly younger than the players traditionally seen at boccia competitions. To include younger athletes and keep them active longer, CCPSA, PSOs and community boccia clubs will have to work together to develop and implement recruitment strategies that specifically target this age group, and to provide opportunities for them.

Where they exist, community boccia clubs play a critical role in the recruitment and development of new athletes and these clubs build a sense of belonging and a network of friendships. Most boccia players started playing because a friend encouraged them. Clubs also provide athletes with important support to manage logistics like booking practice space, fundraising, etc. There are many large cities that currently do not have boccia clubs hence PSOs should consider investing in the development of clubs in targeted areas.



LTAD Implications on Parents/Support Networks

For many parents, the first barrier to involving their child in a boccia program is the misconception that it is not possible for a child with a severe disability to play sports or be physically active. We must do a better job of reaching parents with the positive message that their child CAN participate, and ultimately excel, in sport.

Behind every successful boccia athlete, there is often a team of individuals who help make it possible for them to play the sport, but not every player has access to a group of committed parents or volunteers to take them to and from practice every week or to competitions. This can prevent community boccia athletes from being able to travel to regional or provincial competitions.

LTAD Implications on Equipment

Equipment is one of the most expensive aspects of participating in boccia. Some PSOs have established equipment loan programs or other methods of eliminating this barrier for new clubs or participants. These loan programs serve as an example of how the sport of boccia can grow even more.

Practical implications of LTAD on boccia

As the sport of boccia evolves, so does the equipment required to compete at a high level. CCPSA currently has a small loan program for boccia ramps to athletes in the Espoir program or those on the verge of joining. Otherwise, athletes are left on their own for developing and improving their equipment. If it is an expectation that Espoir and National team athletes have personalized equipment, sharing information with athletes about how to find manufacturers or build their own equipment is important.

LTAD Implications on Competitions

LTAD literature suggests that retired elite athletes should still have the opportunity to access more competitive opportunities such as Masters competitions, currently not available in boccia. CCPSA and competition hosts should explore expanding the existing menu of competition opportunities to include this group.

LTAD Implications on Coaches

In every stage, coaches are heavily implicated in the LTAD model. In order for LTAD to be implemented effectively, it is critical that coaches respect the LTAD principles and apply them appropriately to the athletes with whom they work. Currently, although ideal levels of boccia-specific coach training have been identified for each stage, a full range of coach education is not yet available. CCPSA will need to continue developing and implementing the boccia stream of the National Coaching Certification Program in order to support boccia coaches, and should continue to consider LTAD principles when new courses are designed.

LTAD Implications on Facilities/Transportation

Facilities and transportation can pose two significant barriers to a person becoming involved in boccia.

Not all communities have accessible public transportation systems and when available, it's not always reliable. Most potential boccia players have a disability that is too severe for them to drive their own vehicle. Even if they do have someone willing to be their driver, the cost of owning a vehicle is prohibitive for those on a fixed income. Children and youth must rely on others to drive them.

Secondly, while physical access to facilities has improved greatly in Canada, it is still be an issue in some communities, and facilities that are technically accessible can be difficult for people in electric wheelchairs to access with ease. The cost of accessing facilities can also be a significant barrier.

As athletes are expected to spend more time training and competing, the need for accessible facilities and reliable transportation will also increase. For LTAD to truly change how boccia is played in Canada, athletes need full and fair access to facilities and transportation.

LTAD Implications on Trainability

Much of the LTAD approach depends on testing athletes to determine when they will hit the identified 'optimal training windows', and designing programming appropriately. There is little or no data to show whether or not boccia athletes hit these training windows at the same time as other athletes, and current methods of testing these systems may not be possible for boccia athletes. Testing methods used for able bodied athletes should be reviewed to determine whether they are practical for boccia athletes and there may be a need to develop boccia-specific methods for testing.



Research: Current Player Survey and Provincial Issues

One component of developing the boccia LTAD model included athlete surveys and focus group meetings with provincial representatives (appendix D). Thirty-six athletes at the national and development team level from seven countries were asked about their involvement with boccia. The results had great influence on decisions formulating the various stages of LTAD as the model relates to boccia. Relevant survey results included:

- Most of the athletes competing at the National Championships reported that **they began playing boccia at 20 or 21 years of age**.
- When asked who introduced the sport to them, **the majority of the respondents indicated that friends brought them to the sport**. It appeared that the motive for affiliation/socialization was very important.
- Furthermore, it was found that **parents played a very small role** when it came to influencing these individuals to get involved in sport. Fewer still were introduced to boccia through other sport clubs or encouraged to play by a coach or a child development centre.
- **The current athlete development process is very short**. The majority of the athletes reported that **many made their provincial teams after about 2.5 years of participation** in the sport. National Team players indicated that most of them engaged in the sport for about 5 years before making the National Team
- Most of the athletes competing at the Canadian Boccia Championships reported that they **practiced their sport about 10 hours per week; far less than the time spent by other national level athletes in other sports**.

Further focus group meetings with three provinces identified;

- **The delivery of other social/political institutions affects the sport and varies by province**.
- In Ontario and British Columbia mainstreaming of students presented a **challenge for identifying potential athletes**. For these provinces the most productive method of recruitment might be through physiotherapy

offices and other health related groups rather than schools.

- In Quebec, it's difficult to find new players because confidentiality laws limit access to students who are attending regular schools. Students who are more severely disabled are grouped in specialized schools, but access to them is not without obstacles. To address this challenge, Quebec also targets people that work in rehabilitation centres to talk about athlete initiation and recruitment. Furthermore, they also has difficulty recruiting coaches and instructors.
- All research identified that **parents of children with serious disabilities are preoccupied with many other aspects of their children's lives up until about 8-12 years of age**. All recruitment, therefore, should not be intrusive and directed toward parents and health/care providers.
- Many of the clubs were established **with socialization and recreation in mind, not competition**.

The stages of Long Term Athlete Development for boccia were developed taking into consideration the issues identified above.



Top 10 key factors influencing LTAD for boccia



1. The 10 Year Rule

Scientific research has concluded that it takes a minimum of 10 years and 10,000 hours of training for a talented athlete to reach the elite level. This translates into a little more than three hours of training or competition a day for ten years. The length of time it takes to become an elite boccia player may vary from one division to another, but in general this rule holds true for boccia. There are no short cuts; athlete development is a long term process.

2. The FUNDamentals

Athletes with and without a disability need to acquire basic movement skills agility, balance, coordination - and sports skills running, jumping, throwing, kicking, catching and swimming - through fun and games, and this needs to happen before puberty. **Children with disabilities should be encouraged to develop as many of these skills as they can.**

The combination of basic movement and sports skills is known as physical literacy. Without basic movement skills, a child will have difficulty participating in any sport.

Potential boccia players face difficulties in acquiring

these skills because:

- overly protective parents, caregivers, rehabilitation facility staff, teachers and coaches may shield them from the bumps and bruises of childhood play,
- adapted physical education is not well developed in all school systems, especially for children with more severe disabilities, and;
- it takes creativity to integrate a person with a disability into a group activity where FUNDamental skills are practiced and physical literacy is developed.

3. Specialization

Boccia is a late specialization sport. Therefore, CCPSA relies on other components of the sport system such as schools, rehabilitation centres, recreation centres and other sports, in addition to our own programs, to provide children with opportunities to develop physical literacy. It is critically important that children with cerebral palsy and related disabilities be exposed to the full range of fundamental movement skills as much as possible before specializing in boccia. Intense training in boccia before the age of ten could lead to burnout and overuse injuries.

4. Developmental Age

Ideally, LTAD should be based on developmental age, not chronological age. Developmental age refers to the degree of physical, mental, cognitive and emotional maturity of the athlete. Children of the same chronological age can differ by several years in their level of biological maturation. Some disabilities are known to influence childhood and adolescent development and the timing of puberty, however, much more research is needed before a full understanding is achieved. **Until this time, generic maturation charts will be used as a general guideline, and chronological age ranges have also been assigned to each stage to give a general idea of the ideal age of athletes in each stage.** Applying this information to specific athletes with a disability is a good example of coaching being an art as well as a science.

5. Trainability

All physiological systems are always trainable, but there are optimal periods in development when the

body is more responsive to specific types of training. Little or nothing is known about windows of optimum trainability for children with cerebral palsy and related disabilities. **In the absence of evidence to the contrary, the ages of optimum trainability should be adjusted based on the observed age of puberty.** Whether there are optimum periods of trainability during post injury rehabilitation needs to be investigated.

6. Physical, Mental, Cognitive and Emotional Development

A major objective of LTAD is a holistic approach to athlete development. Sport can play a critical role in helping people with disabilities to develop a positive self image and enhance their self concept. For this reason, at every stage, coaches should consider the emotional, mental and cognitive development of the athlete, in addition to their physical development. For a complete overview of the characteristics of emotional, mental and cognitive development and their implications for coaches, see Physical, Mental and Cognitive, and Emotional Development Characteristics appendix C. When interpreting these implications, coaches should begin by comparing the characteristics that they observe being demonstrated by an athlete to the charts, rather than making assumptions based on chronological age.

7. Periodization

Periodization is time management. It is a planning technique that provides the framework for arranging training and competition activities into a logical and scientifically based schedule to achieve optimum performance at the required time. There is no evidence that periodization for boccia athletes is substantially different from that for able-bodied athletes. The participants' physical fitness level may reduce strength and endurance, and so may their disability. Fatigue should be carefully monitored, and rest and recovery periods should be adjusted accordingly.

8. Calendar Planning for Competition

The LTAD approach applies ratios for training to competition as within the able-bodied sport system, under-training and over-competition are common. There is no evidence to suggest different ratios for

athletes with disabilities and currently, this is not a problem in boccia. The number and quality of local and provincial boccia competitions varies widely across the country, and there is minimal competition available for athletes in the Learning to Train and Training to Win stages. Increased competition in these stages will improve optimum development.

9. System Alignment and Integration

LTAD is a holistic approach to athlete development. For the system to work well, all elements of the sport system must be aligned and integrated with each other. For boccia, this includes competitions, coaching, funding, facilities, equipment, sports assistants, sport science, ancillary services, daily living support and talent identification and development.

True system alignment represents one of the greatest challenges to implementing the LTAD approach.

As a late specialization sport, boccia depends on treatment centres, schools and other sports to develop physical literacy and early fitness. Similarly, each



Top 10 key factors influencing LTAD for boccia

element of the boccia system clubs, PSOs, Provincial Paralympic Organizations, invitational competitions and recreation programs must be integrated and aligned with one another. For the system to work well, they must be clear in their responsibilities and how they relate to the big picture of athlete development. At its best, LTAD allows boccia players to identify the opportunities available to them and to understand the path they need to follow to achieve their goals. In order for this approach to work, the process of designing and implementing LTAD programs must be athlete centred, coach driven, and administration, sport science and sponsor supported. In a system

where the various elements are integrated and aligned, boccia players will be less likely to fall through the cracks.

10. Continuous Improvement

We should continually seek out, respond to and integrate new scientific research and sport specific innovations. LTAD is based on the best available scientific research, but knowledge evolves, especially in the relatively young sport of boccia. Therefore, LTAD is also based on the concept of continuous improvement.



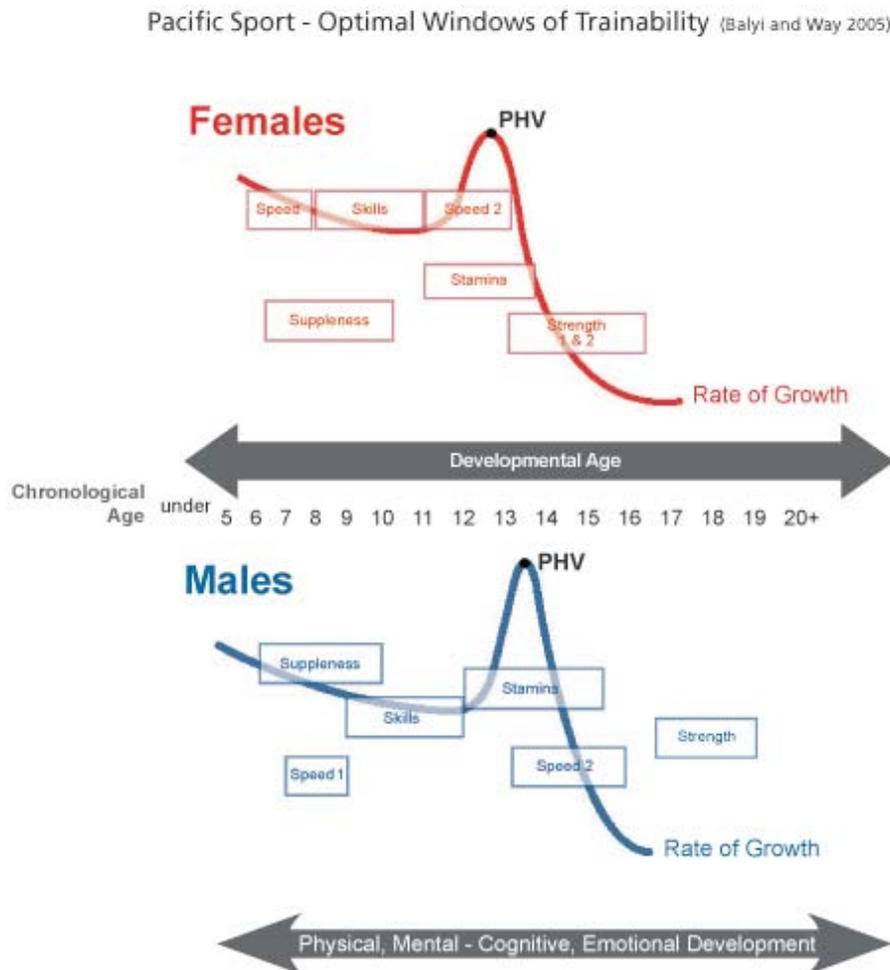
Trainability

Trainability is the responsiveness of developing individuals to training stimulus at various stages of growth and maturation. All systems are always trainable, but there are certain 'critical windows' when training a specific capacity (stamina, strength, speed, skill and suppleness) has an optimal effect. For boccia, stamina, strength, skill and suppleness are more important than speed. The timing of these windows has been identified in the chart below (see Figure 1). Since boccia is a late specialization sport, with most athletes coming to the game after age 15, boccia relies on other sports and activities to train these capacities.

The trainability of these systems for children with disabilities, and in particular, more severe disabilities is not well understood. **In the absence of evidence to the contrary, the ages of optimum trainability should be adjusted based on the observed age of puberty.** (See Figure 2)

It has been suggested that athletes who miss these windows will never reach their genetic potential. However, this does **not** mean that athletes who enter boccia later will never be able to improve their capacities or achieve a high level of success in boccia. Boccia is such a young sport that it's doubtful that any

Figure 1



Key concepts in LTAD

of the current elite players has reached their full genetic potential. In addition, science has shown that humans vary widely in their responses to a given stimulus, both in how much and how quickly they change. This variability reinforces the need for LTAD, so that athletes who respond more slowly are not left behind.

Current methods of testing these systems cannot be used for most boccia athletes. CCPSA recognizes that there is a need to review testing methods used for able

bodied athletes to determine whether they are practical for using with boccia athletes. Following this review there may also be a need to develop boccia-specific methods for testing. It may be more effective to measure athletes against themselves than against a generic norm.

For example, measuring body tissue content such as fat and bone density might be more important for boccia players than measuring aerobic capacity. In order to improve bone density, many of the training methods are the same as for aerobic capacity (i.e. strength training will improve bone density, or retard bone breakdown). Our ability to relate functional training to the improvement of function is limited. In the same way that two people recovering from a stroke could complete similar physiotherapy routines and end up with very different functional capacities, merely completing strength training does not ensure that two boccia athletes will achieve similar functional results.

Stamina

The critical window for stamina occurs at the onset of Peak Height Velocity (PHV), which is the adolescent growth spurt.

Strength

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

Speed

For boys, the first speed training window occurs between the ages of 7-9 years (chronological age) and the second window occurs between the ages of 13-16 years. For girls, the first window occurs between 6-8 years, and the second is between 11-13 years.

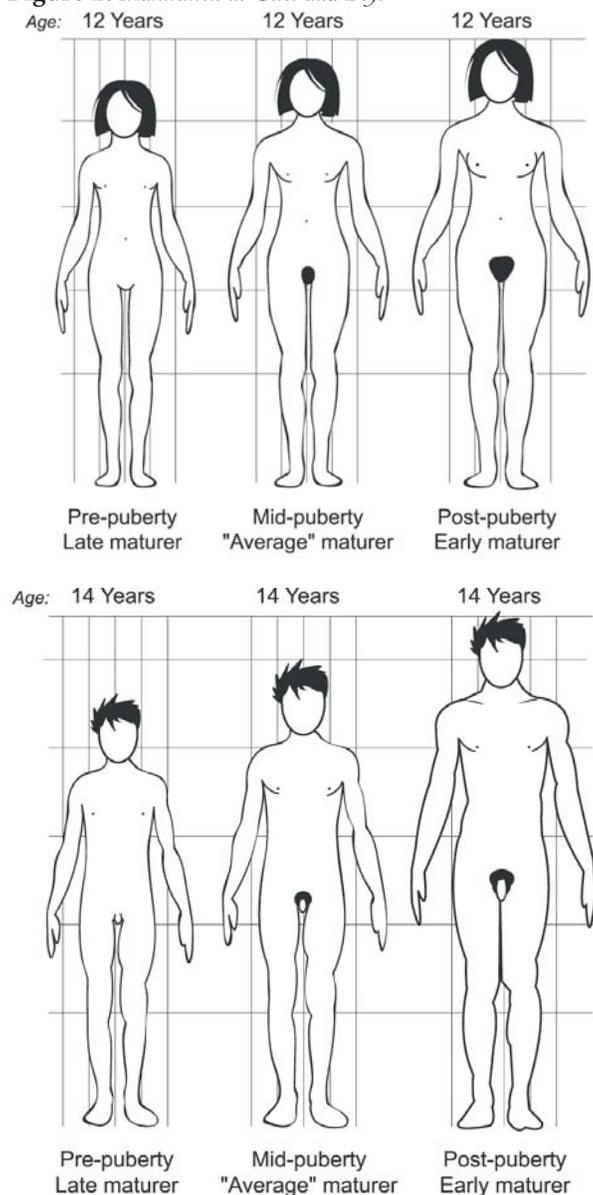
Skill

The window for optimal skill training for boys takes place between the ages of 9-12 and between the ages of 8-11 for girls.

Suppleness

The window for suppleness for both genders occurs between the ages of 6-10. Special attention should be paid to flexibility during PHV.

Figure 2: Maturation in Girls and Boys



Adapted from "Growing Up" by J.M. Tanner, Scientific American 1973





During the early part of this stage, the life of a family with a child with cerebral palsy or related disability is a journey of discovery. Faced with the diagnosis of a severe physical disability for a newborn infant, the furthest thought from the family's mind is that this child might become an athlete. Focus centers on what treatments their child needs at the moment and incorporating these activities into their everyday life. Early intervention programs through infant development and child development centres occupy key partnership chairs around the family's table.

Family schedules will be busy and include therapy sessions and specialist visits. A developmental team of health professionals will confer with the family and work together to maximize the child's capabilities. It may be said that these potential athletes are already 'training' when they progress through the therapy routines prescribed by their physiotherapists and occupational therapists. These may take place in varied environments whether on horseback in an arena, in a swimming pool or in the child's physical education class at school.

Growth and development of the child takes place intellectually, socially, emotionally, and physically. All of these areas are influenced not only by inherent capability, but also by the richness and fullness of their environment. The child's physical development is influenced by opportunities offered to him/her. For this child, during this entire stage, the freedom to explore and the resultant learning is of great importance. The benefits are influenced by the child's health, physical capability, and the fullness and nature of environmental experiences. The world of play is

the child's 'work', and as other young children enter this child's world, learning takes place within an arena of imagination, creativity, and exploration.

Later on in this stage, starting school introduces the world of organized socialization. This will be a time of 'congregation' which among other things, will provide a venue for performance comparison in many different areas for these children. The response of the child to these differences will depend on their prior experiences within their environment and support system. Transition planning is of key importance to ensure the child is 'known' to the school and that integration opportunities are fully explored, including school physical education.

While this is happening, the amount of therapeutic services and clinic/special interest interventions is decreasing. After the child starts school, therapy in most provinces is on a consultation basis only. The continuation of physical activity is very important for the children, not only to retain, but to also improve on the gains they have made during therapy.

In the latter part of this stage, families often begin pursuing recreational opportunities within their communities. Generally speaking, children with disabilities wish to experience the same opportunities as their classmates. Agencies such as Easter Seal Camps and disability sports organizations may hold summer and winter camps to introduce adapted sports to children with physical disabilities. A family's community recreation centre takes on an important place in their developmental lives.

Facilitating the development of postural control and movement, often augmented by the use of specialized equipment and specific exercises, are the main therapeutic foci of the active awareness stage. Intervention addresses mobility, stability, strength, balance and control, and is dedicated to helping children explore their worlds both physically and socially. Achievements in these areas are also precursors to core sport activities. For all children, there is a need to practise movement skills and social engagement gives bonding purpose to this practice for the child. The realization of being an athlete doesn't exist yet.

Active Awareness *Age: 0 - 9 years*

At the end of this stage, children are emerging from a heavy focus on therapy and treatment. For some, it is their first opportunity to have some choice about how to spend their leisure time. To help develop a wide range of basic sport skills, as well as coordination and body awareness, children should have the opportunity to participate in as wide a variety of activities as possible.

Objectives

Learn fundamental movements through the hard work of play.

Key outcomes

At the end of this stage, participants should have acquired these skills:

- Balance
- Able to physically position wheelchair
- Able to position their body
- Able to throw something to a target
- Basic flexibility, endurance, strength, power, posture
- Good nutrition consistent with the Canada Food Guide
- Basic communication skills
- Understand sportsmanship and fair play
- Confident in social situations
- Able to adapt to change

Technique

By the end of this stage, athletes should be able to move confidently in their wheelchair and be able to throw balls at a target. The focus should be on learning how to deliver a ball either by throwing or using a ramp. There is no need at this age to specialize in boccia.

Tactics/Strategies

Children in this stage do not need to learn boccia-specific strategies and tactics. They should learn how to listen and follow instructions, and how to play a variety of games with defined rules.

Physical Preparation

Efforts should be made to maximize their flexibility, muscular and cardio respiratory endurance, strength, power and posture by participating in a variety of activities such as swimming, wheeling or any other appropriate activities that use the body's large muscle groups.

Equipment

At this stage of development, equipment should be

fun, safe and functional, but not sport specific. Using bean bags shaped like animals, balls with interesting textures anything that is fun and encourages children to throw will suffice. Young children should be exposed to a variety of equipment to determine what best meets their specific needs.

Coaching

Coaches in this stage should have taken the Community Initiation NCCP course and will require good knowledge of fundamental movement skills, as well as basic growth and development related to children with cerebral palsy and related disabilities. They should have the ability to assess physical literacy and make recommendations to the children and parents to improve any gaps.

Training (Volume & Focus)

Children should be as active as possible in a wide variety of activities, with no serious boccia training occurring.

Competition

Children in this stage do not participate in formal

“About the age of nine, the recreational therapist introduced Alison to boccia.

It was wonderful for all the kids. They whizzed around, teasing and chasing each other. Sport seemed secondary to The socializing and Alison made friendships that last to this day.”

- Debbie Kabush, mom to Alison, Paralympic Bronze Medallist





Classification is the process of ensuring boccia players who compete against each other are of the same ability. A physiotherapist, neurologist and expert in the sport of boccia work together to

Ancillary Capacities

For children with difficulty speaking, this is the time to find ways for them to communicate as independently as possible, so they can voice their needs and desires. In this stage it's also important for children to experience and have success in a variety of social situations, and learn how to be part of a team.

Officials and Classification

Since participants are not expected to be playing boccia in a formal setting yet, officials and classification are not required.

boccia competitions, but could be exposed to fun competitions in a variety of sports (such as a fun regatta at the end of a swimming program).

Mental Preparation

The main goal in this stage is fostering self confidence and the desire to stay involved in sport. There needs to be a variety of activities offered so that children stay interested. Coaches should focus on creating a fun, social and welcoming environment, so children will want to come back. Some suggestions are charts to track personal improvement, visits from Paralympic athletes and team building games.

Nutrition

By the end of this stage, parents and children should be educated about the importance of making sound nutritional choices.

Monitoring (Sport science)

At this stage children will start their growth spurt, especially females.

Recent survey research has shown the majority of current boccia participants are introduced to the sport at a later age through friends. Although participants in this stage are becoming young adults, surgeries and therapies may have prevented them from being involved in organized sport at an earlier age. They are likely now to be spending less time on physiotherapy and are looking for new social and recreation activities.

Physical activity benefits children and adolescents with cerebral palsy and related disabilities in much the same way as their able bodied peers. Studies have shown that children with cerebral palsy who participate in a fitness program experience improvements and a variety of fitness measurements, including strength and function¹. Children who are not physically active run the risk of losing the functional gains they have made in therapy and can lead to a sedentary lifestyle with its negative consequences.

At this stage, it is important to include persons with a wide range of disabilities in boccia programs. This produces a broader base from which to build a successful national program and provides an

important sporting and recreation opportunity for people who do not fit within the narrower Paralympic divisions. Learning to Train is mainly based on a recreation context but also provides opportunities for appropriate competitive experiences.

A large part of the success of the participant is their readiness to join a program, and the acceptance by themselves and those around them that the participant CAN become an athlete.

It has been proven that playing sports helps individuals develop positively both physically and cognitively. In this stage, athletes are still encouraged to have fun and play other sports such as bowling, wheelchair curling, obstacle course, water activities, race runner, power soccer, hockey and wheelchair dance. Boccia should be introduced as a fun sport, concentrating on sportsmanship and being able to complete the game rather than winning. Increasing the social aspect of the experience will result in athletes wanting to continue participating, as with all teens interaction with friends is very important at this stage.



“I like playing boccia because it is a sport I can actually play on my own, even with a disability. I also enjoy meeting new friends, plus competing in tournaments.”

- Ben Guerin, 16, Chatham Tornadoes

¹ *Dodd et al (2002); Blundell et al (2003), Taylor et al (2004); Fagala Pinkham et al (2005)*

Objectives

Learn to play boccia.

Key outcomes

At the end of this stage, participants should have consolidated the skills acquired in Active Awareness, and acquired these new skills:

- Know sequence of skills to make a shot
- Basic understanding of the angles in a boccia game
- Know the basic boccia shots

Technique

The objective is to learn and consolidate basic boccia skills and learn proper technique. See the Boccia Skills Chart (Appendix xx) for a more detailed description of these skills. Individual skills such as propelling the boccia ball in different ways (hand, foot, ramp), postural control, flexibility and stretching are crucial in developing good physical literacy. During this stage athletes should try a number of methods of ball delivery to determine which method works best for them.

Tactics/Strategies

The focus is on understanding the game and remembering general rules and basic tactics. At the

end of this stage, athletes should be able to choose where they would like to place the jack, and be able to do so with consistency. They should also understand the strategy involved in choosing red or blue balls after the coin toss. During a game, the player should be able to decide when to protect their lead or maximize points.

Physical Preparation

In this stage the focus should be on consolidating gains made in flexibility, muscular endurance, cardio respiratory endurance, strength, power and posture. Athletes will need to participate in additional activities such as swimming or a fitness program to maximize improvements in this area.

Equipment

Equipment does not have to be sophisticated in this stage. Homemade ramps can be used, and balls can be shared. Still, equipment should “fit” the stature and ability of the athlete as much as possible. A scaled down court could also be used, especially for younger players or those who need to build more strength. Alternate equipment can be used for 'fun' skill developing activities like beach balls, balloons, bean bags, soccer balls, plastic bowling pins, etc. to vary experiences.

Coaching

Coaches should have completed NCCP Community Initiation training. Coaches who have completed Introduction to Competition may also coach athletes in this stage, but should be emphasizing skill development, having fun and participating, not competition.



Training (Volume & Focus)

Athletes should be training 1-2 times per week. Primary focus is on skill development (75%), with some time spent on game play (25%).

Competition

Once the athlete has grasped the concept of the game, fun intra-club tournaments and local fun tournaments can be introduced. This may be their first introduction to a competitive environment. The focus of these tournaments should be on developing sportsmanship and the ability to play as part of a team.

Mental Preparation

This age group is ready to begin learning what to focus on and how to develop that skill. In doing this they will begin to understand that what they think and feel affects their performance, and how to control those thoughts and feelings when they are under stress. Athletes in this stage can also learn to set goals and manage their time. Athletes should be introduced to basic relaxation and mental imaging techniques. Athletes should also be developing assertiveness and leadership skills. It could also be appropriate to begin teaching athletes how to communicate effectively with their coaches and how to ask for feedback.

Nutrition

Coaches may bring in guest speakers to talk about nutrition and other topics. Athletes should know how to make sound nutritional choices on a daily basis, as well as on game day.

Monitoring (Sport science)

No formal sport specialists or monitoring is required at this stage. Fitness maintenance, including mobility, flexibility and positioning the participant in his or her chair are of prime importance.

Ancillary Capacities:

Athletes in this stage should be starting to focus more on being in control of their daily life needs rather than relying on others to do so. Coaches should support this by fostering independence whenever possible; for example, at this stage athletes could be responsible for leading the group in warm-up and cool down at practice.

Transportation to and from practice may be an issue as parents are often the main mode of transportation for younger athletes but older athletes might depend on public transport. Personal care needs are generally looked after by the athlete's parents or a companion, depending on their personal situation, and should not be provided by the coach or club. School responsibilities and commitments to other activities may interfere with attending practices on a regular basis.

It is important for athletes in this stage to start becoming aware of the difference between personal relationships and sport relationships (i.e. differentiating between friends and sports assistants). Athletes should also be aware of their own health status and personal care needs, know how to stay hydrated and understand basic skin care to prevent breakdowns.

Officials and Classification

In this stage the rules may be modified. Accredited referees and classifiers are not required. Parents, siblings or volunteers who are familiar with the rules can "officiate" at the fun tournaments. Junior and novice referees may also be used in the fun and intra-club tournaments.

Formal classification is also not required. However, towards the end of the stage, a coach might be wise to bring in a classifier to observe athletes who are interested in competing, or the coach feels may border between two classes. This may create a dilemma for the coach as not all classes are eligible to participate in higher levels of competition. Ultimately, any athlete who wants to compete past this stage must be classified. The coach will need to decide the optimal time to do this and prepare the athlete for the results.

Athletes are learning to play boccia in a more competitive arena, although fun is still a primary focus. This stage mainly consists of athletes who want to learn more about playing boccia and want to compete. There is still a strong recreational base at this stage, and athletes with a wide variety of disabilities are still encouraged to participate, although competition is

becoming more prevalent. At this stage, the athlete is now moving toward the “game” concept where there is a winner and a loser. At the end of this stage, athletes should be competing in their provincial championships.

Objectives

Fun with a purpose

Key outcomes

At the end of this stage, athletes will have further developed and consolidated the skills they acquired in Stages 1-3, and will have acquired these new skills:

- Confidence in a variety of game situations
- Basic understanding of team and pairs play
- Understand offense and defense
- Identify and correct technical errors
- Combination shots
- Able to coordinate packing and preparing of personal and sports equipment for travel

Technique

At this stage, athletes should be learning how to choose the optimal position of their chair in the throwing box. Athletes should be looking to perfect their ball delivery techniques through feel and feedback from the coach as well as learning to transfer their technique to competition.

Tactics/Strategies

At this stage, the athlete will be “thinking” boccia. The athlete should concentrate on learning the finer points of the rules and abiding by them such as penalties and etiquette. This is the time for introduction to pairs or team play and developing the basic mental, physical and strategy skills used in team or pair play. Athletes should be able to keep track of their playing time, understand offense and defense in addition to identifying and correcting technical errors. Athletes begin learning combination shots in this stage and using strategy to choose which set of balls to use for a game.

Decision Making

Athletes are able to decide which ball to throw in game situations, when to use different pieces of equipment (extension, towel etc.) and are able to assess when to use techniques to increase/decrease arousal.

Physical Preparation

Fitness (cardio respiratory, muscles strength and endurance), postural control, throwing agility, flexibility and speed will become even more important at this stage of Boccia development. It is important that the athlete work in partnership with the coach to develop a fitness training plan. Maintaining physical health and wellness remains important at this stage in order to attempt to prevent the development of secondary impairments such as pain, muscle contractures etc.

By taking on responsibility for him/herself in this area, the athlete will succeed in many other aspects of their life. Being successful in this ownership of their own physical goals indicates that the individual is maturing and ready for more responsibilities. It is recommended that athletes participate in another sport for cross-training. Athletes should also be learning techniques to increase/decrease arousal (breathing exercises etc.).

Equipment

At this stage, equipment (chutes, balls, ball holders, chairs) are more specialized to the athletes' individual needs and athletes should consider getting their own personal equipment. Regulation courts are used.



Coaching

Coaches in this stage should have completed either NCCP Community Initiation and Ongoing training, or Introduction to Competition. The coach may group athletes together who have similar abilities.

Training (Volume & Focus)

Athletes are training 3-4 times per week. Primary focus is on skill training (60%) and secondary focus is on competition (40%).

Competition

Having fun remains important as the level of competition also increases in this stage. The athlete is competing in inter-club tournaments, “league” play, regional competitions, open and invitational tournaments, moving towards competing at a provincial competition with the goal of becoming a member of the provincial team. Game etiquette is introduced at this time, including call room and protest procedures. Attending these tournaments will inspire the athlete to new aspirations as long as the level of competition is appropriate. At this stage athletes will find it difficult to compete in several other sports.

Mental Preparation

Athletes in this stage should be able to evaluate the

Personal Care Assistants are individuals who assist athletes with their activities of daily living (i.e. Eating, dressing etc.) during practices or competitions.

Some athletes, depending on their classification, need a **Sports Assistant** on court during a game. This individual may hold their ramp, hand them balls or otherwise assist them during the game. These assistants may also help with their personal

advice of their coach and understand the rules enough to participate in the development of their game strategies and tactics.

Nutrition

Athletes should be aware of their food choices, and continue to refine their nutritional skills and strategies based on the Canada Food Guide. A nutritionist should be brought in by the coach.

Monitoring (Sport science)

Specialists in the areas of seating and fitness should be consulted. Athletes should experiment with various foot rests, cushions and strapping to determine their ideal playing position.

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. More volunteers will be needed to help with ball retrieval, interclub tournaments etc. Athletes should be encouraged to maintain their own health and their own equipment as much as possible. Some athletes in this stage may want to transition from having their parents provide their personal care to using other people (paid staff or volunteers), but this may not be an option for everyone.

“I feel that my role as a sports assistant is to be a support system for the athlete. I have the best role in sport. I get to be the first person to congratulate or comfort and I get to be part of the process.”

- Shannon Sydorak, two-time Paralympic Sports Assistant

Some athletes (depending on their classification) will need trained sport assistants. Athletes should know what their assistant needs to do, and make appropriate choices in selecting their assistants. Athletes must also ensure their assistant is properly trained. Attending a 'transferring' seminar prior to working with the athlete is highly recommended. Research shows that training for making successful transfers from wheelchairs and beds prevent injuries up to 70%. Recruiting and training sports assistants can be a big challenge, and could prevent an athlete from participating in boccia.

Athletes also need to know how to manage their sports or personal care assistant during trips to ensure their assistant is rested and is doing what the athlete needs them to do. Assistant must know how to safely complete all of the requirements for the athletes' personal care while away from home.

As in earlier stages, transportation and daily living needs may be additional stressors for the athlete, and could prevent regular attendance at practices and competitions.

As athletes in this stage are starting to attend competitions, they may also be traveling for the first time. Athletes who are going to travel to competitions

need to learn how to coordinate the packing and preparation of all of their personal and sports equipment (wheelchair, ramp, medications, clothing etc.). They should also know and follow their medication prescriptions and be aware of any medicine interactions.

Officials and Classification

Accredited officials are introduced for the appropriate level of competition. Coaches may invite a referee to a practice to simulate the competition experience. If they have not been classified before, athletes must be classified at this time. It is important to note that when they are formally classified, athletes may find that they do not fit within the official Paralympic boccia divisions offered at sanctioned national and international competitions. However, these athletes are still able to compete in the 'open' division offered at many other Boccia events. Coaches should do their best to prepare athletes ahead of time for the stress of the classification process and educate them about their options. The athlete must be prepared to accept that classification is an integral part of disability sport.

This stage includes athletes who are provincial team athletes ('talent identified'). Their goal is now to become a national team athlete. These athletes show more dedication, more focus and are less dependent on the standard mode of operation for training. Winning the game is the main focus of the athlete; the recreational element is diminished. All athletes are still encouraged to participate and compete, but the emphasis is on the Paralympic divisions. Athletes who

do not fit in these divisions will continue to be encouraged to participate where they are most comfortable, either in the 'open' division (offered at many regional, provincial and invitational events) or within a local community-based program. Although this stage focuses more on competition, the experience should still be enjoyable and worthwhile for all athletes.

Objectives

Take it to the next level

Key outcomes

At the end of this stage, athletes have further developed and consolidated the skills they acquired in Stages 1-4, and will:

- Make the provincial team
- Plan and execute a multi-shot strategy
- Adjust strategy during a game
- Remain focused under pressure

Technique

Athletes continue to refine their ball delivery techniques, shot repertoire and chair positioning skills so that they become 'automatic'.

Tactics/Strategies

There is increased emphasis on tactical training, focusing on team and pair strategies and personal strengths and abilities. Athletes begin learning how to plan and execute a multi-shot strategy. This includes learning to assess the risks associated with each shot and choose their shots accordingly. At this age, athletes should be able to adjust their game strategy during individual games. An athlete knows all the rules and is comfortable asking questions and requesting clarification of decisions during matches.

Decision Making

With increased competition at this stage, athletes will experience a wide variety of game situations, and should be building a mental database of information to draw on when making critical game decisions, such as deciding when to protect their lead, and when to maximize points. To make these decisions, athletes need to understand the competition structure and keep a clear head under pressure (e.g. so in their last game in pool play, they are able to remember that they need to maximize points to qualify for the play-offs).

Physical Preparation

In this stage, athletes should have a personalized fitness plan that incorporates cross training activities. The plan should be as assessment based as possible. This personal plan will include among other things, skill acquisition strategies and basic body maintenance to maintain health and wellness. Continued focus on mobility and stretching is important and daily physical fitness activities should be part of their lifestyle. Athletes should demonstrate a positive mental attitude towards training in partnership with their coach.

Equipment

The athletes in classes BC1 and BC3 compete using trained "on court" sport assistants and all athletes have their own specialized individual equipment (balls, ramp etc.).

Coaching

The coach athlete relationship is now more of a partnership. Coaches at this stage should have completed NCCP Competition Development training and be participating in ongoing professional development opportunities.

Training (Volume & Focus)

The major focus in this stage is on increasing the



volume of training to 4-5 times per week. The ratio of training to competition should be 50:50. The increased focus on winning means that there will be a strong competitive element to practices. At this time it is very important to familiarize athletes with the physical and mental challenges of extended tournament play. During a competition, athletes may play 4 or 5 games per day, for a total of 2.5-5 hours on court. Endurance training for the body and the ability to sustain focus are critical.

Competition

In this stage athletes are attending an increasing number of competitions. They are competing on their provincial team at the Canadian Boccia Championships, in addition to regional and open competitions. Some athletes may have access to Provincial High Performance Training Centres and camps, depending on where they live.

Mental Preparation

A sport psychologist may be involved in this stage to begin providing ongoing training and support. Team



and pairs play are becoming more of a focus, so learning how to communicate and function as part of a team is important.

Nutrition

Athletes in this stage should demonstrate that they are able to incorporate proper sport nutrition, based on the Canada Food Guide, into their lifestyle.

Monitoring (Sport science)

The autonomy of the athletes in this stage will be enhanced by meeting with sport science specialists and formalizing a personalized fitness plan. Anti-doping education takes place.

Ancillary Capacities

The athlete's independence will figure greatly in his/her success. Athletes in this stage should show signs of readiness to make their own decisions, solve their own problems, be self-reliant and be able to organize their life with a focus on succeeding in boccia. Their parents may not be involved in training anymore.

By this time, athletes in the BC1 and BC3 divisions should have trained sports assistants who travel with them consistently to each competition. Athletes in the BC2 and BC4 divisions should also attempt to have a personal care assistant who can travel with them regularly. As noted in 'Training to Train', selecting an assistant who can meet the athletes' individual needs and ensuring that they are properly trained is very important. As athletes will be traveling more extensively across the country in this stage, they need to understand their medical condition and make the appropriate preparations for travel (sleep maintenance, jet lag strategies, understanding effect of time change on prescriptions etc.).

Officials and Classification

The athlete should be classified by an accredited provincial classification team before attending the national championships. All athletes are classified by an accredited national classification team at their first Canadian Boccia Championships. Follow-up classifications may be required for some athletes. Referees will be national level or higher for national competitions.

Athletes in this stage are on their provincial team and striving to make the National team. It is possible that they have been on their provincial teams for a couple of years. These athletes concentrate on Boccia as their main sport and participate in all the local and provincial competitions available to them throughout the year. The CCPSA Espoir Program was developed for athletes such as these. Athletes who are not in the

Espoir program can and do still participate in boccia at this stage, but are not eligible for additional support from CCPSA.

The porous quality of the CCPSA LTAD model allows athletes to pass back and forth between the two streams - participation and competitive.

Objectives

Qualifying for the national team

Key outcomes

At the end of this stage, athletes have further consolidated and refined the skills they acquired in Stages 1-5, and will:

- Qualify for the Espoir Program
- Play well under a variety of conditions, maintaining good technique under pressure and fatigue
- Manage their lifestyle to meet training commitments
- Compete well against national team members
- Understand their role in critical thinking and decision making for their training, performance, equipment, schooling and social life under the guidance of their coach
- Control their own environment
- Have their own specialized boccia equipment
- Be able to execute game strategies consistently

Technique

Appropriate positions for good postural control while throwing are explored. Athletes will begin to use computer analysis programs such as Dartfish to improve the delivery of their balls to the target. Athletes will begin learning how to combine the best type of ball with the best throw to give optimum results.

Tactics/Strategies

Athletes start to formalize their team/pairs positions

Espoir Program CCPSA coaches identify athletes who show promise and have the potential to rise to the National team and invite them to join the Espoir program. This program provides athletes with valuable coaching in new tactics and techniques, access to additional support for sport science and equipment refinement, and opportunities for national and international competition experience.

on the court, although they still spend some time practicing playing from every box. Team building skills are reinforced at this stage.

Decision Making

Athletes in the Espoir program will have access to a sport psychologist and should be refining their ability to make decisions on and off the court. As training and competition demands are increasing, athletes need to be able to manage their time appropriately.

Physical Preparation

Three to four hours a week are spent on stretching and mobility exercises to maintain postural control and flexibility. Resistance training with the supervision of a professional is also recommended. Research has shown that strength training does not increase spasticity and can strengthen muscles in athletes with CP. Grasp release agility may improve with practice¹. Swimming or another sport can be used as cross-training to maintain a good cardiovascular

¹ Eliasson, Ann-Christin et al. (2006)



capacity. The volume of physical training may vary from one athlete to another as some reductions may have to be considered for athletes with more severe disabilities.

Equipment

Athletes have their own specialized boccia equipment and accessories, such as personalized balls, head pointers, ball holders, ramps, seating positioning, and strapping. This enables athletes to play the game more strategically and to know exactly how their equipment will perform in game situations.

Coaching

Coaches have NCCP certification in Coaching Development or High Performance. This stage also includes Espoir coaches who are mentored by the National coach to maintain continuity in the program. When possible, Espoir coaches are invited to travel to international events to assist with the national team. Athletes are also expected to have a personal coach in their resident province. The Espoir coaches communicate with these personal or club coaches to follow-up on their training and to recommend technical and tactical strategies for the athletes' improvement. Athletes are required to keep a logbook of activities and communicate frequently with their Espoir coach.

Training (Volume & Focus)

During the year athletes are expected to train on court

8-10 hours per week for 46 weeks. Athletes might have access to training centers for court practice but any accessible, level floor is acceptable. Espoir athletes attend national training camps, either by themselves or in conjunction with the national team program.

Competition:

Espoir athletes are given the opportunity to participate in targeted Canadian and international invitational events if appropriate opportunities are available.

Mental Preparation

Athletes are provided with regular access to the national team program's sports psychologist, to begin working in earnest on their mental skills.

Nutrition

Athletes are provided with access to the national team program's nutritionist and will begin tracking their daily diet, and may have a personalized nutrition plan.

Monitoring (Sport science)

Anti-doping education continues to be updated by the national coaching staff. Athletes are introduced to the Performance Enhancement Team (PET) concept. Using a team approach, coaches, ancillary support specialists (such as sport psychologist, physiotherapist and nutritionist) and athletes work together to achieve results.

Ancillary Capacities

The amount of travel increases when athletes are named to the Espoir team. Athletes may travel to another country for the first time. Therefore, they need to know how to organize themselves and their equipment for an extended trip. It is also very important to be training a dedicated sport assistant at this stage as frequent changes of sport assistants can impede an athlete's progress. It imperative that the sport assistant understands that they are an integral part of the whole team.

“I started swimming because my coach told me that it could help my game. I now feel more relaxed when I play boccia and I have better control of my spasticity.”

- Eric Lefebvre, Espoir Program

Success in sport has a positive influence in other areas of the athletes' daily life as they learn to achieve short term goals and personal long term goals. Fitness activities, weight training and awareness of proper eating habits contribute to a healthy lifestyle.

Officials and Classification

The athletes may encounter their first team of international classifiers and certified referees officiate at sanctioned National and International events. At this stage there will be very few changes in classification except with athletes whose disabilities which are not stable, such as athletes in the BC4 class.

Athletes are committed to boccia and are prepared for international success. They are experienced and are part of the national team program; as such they are invited to regular training camps and have more opportunities to attend invitational international competitions. They represent Canada at Regional meets in the Americas and the World Cup, World

Championships or Paralympics; many of these elite athletes are receiving funding from the Athlete Assistance Program and other sources. In this stage, athletes are ready for international competition and are willing to make greater sacrifices in their personal time to play boccia at the high performance level.

Objectives

Winning at national and international competitions

Key outcomes

At the end of this stage, athletes have further refined the skills they acquired in Stages 1-6, and

- Achieve podium finishes at the World Championships, World Cup and Paralympic Games
- Have a trained, dedicated sports assistant
- Use Dartfish or other computer programs to track opponents and perfect their technique

Technique

Only minor changes to technique occur in this stage.

Tactics/Strategies

Athletes are practicing their court positions in team and pairs. Court position is determined by the coach, taking into account that athletes' ability to throw, although athletes also train in other boxes to become adaptable and be accurate from more than one box. There is an increased focus on training for competition situations.

Decision Making

Athletes can identify multiple solutions for each on court situation and decide which one is the best for the circumstances.



Physical Preparation

Stretching and mobility training continues to be very important and moderate weight training, supervised by a professional, is recommended to foster good postural control. Physical training is to be done 3 to 5 times per week for an average of 3 to 5 total hours (in addition to on court training). Using swimming as cross-training is recommended. The time used for any another sport or activity diminishes as the volume of training at this stage is much higher. The volume of physical training may vary from one athlete to another according to the physical limitations of their disability but should not exceed 90 minutes.

Equipment

Athletes have optimum personalized equipment. Balls, ramps and wheelchairs that are customized to their specifications are of critical importance and athletes may have specific balls for specific opponents or game strategies. Athletes also have personalized boccia accessories such as ball holders and head pointers, to meet their individual needs and give them maximum advantage over their opponents.

Coaching:

A full-time professional National high performance coach and a part-time assistant coach work with the National team in the Training to Win stage. Ideally, these coaches are in the High Performance phase of the National Coaching Certification Program, but may,



in some circumstances, be in Competition Development. The head coach has mentoring responsibilities with developing coaches as the National team coach and the assistant coach work with the athletes' personal coaches and travel at least once a year to personally review the athletes' progress.

At international events, there are a minimum of three coaches with the team. Some of these may be coaches from the Espoir program who are being mentored by the National head coach, additionally the athletes have a personal coach for domestic practice.

Training (Volume & Focus)

Athletes are training on court 12 to 15 hours per week, a minimum of 48 weeks per year. Some may have access to national and provincial training centres for practice and cross training depending on where they live. Other athletes keep a log and report monthly to the head coach. There are 4-6 training camps per year for the National team, which may be attached to a competition.

Training time can increase when the team is preparing for major international events and athletes may complete more than one periodization as they prepare for multiple international competitions. As gym availability is sometimes at odd hours of the day, they may need to locate several local venues with level floors to practice on.

Competition:

The optimal ratio of competitions to training is 40% training vs. 60% competing; athletes will attend a minimum of five competitions per year.

Mental Preparation

All team members have regular access to a trained sports psychologist. The psychologist may travel with the team to international competitions and domestic camps.

Nutrition

Ongoing nutritional support is provided by a certified nutritionist who has experience working with people with disabilities. The focus is on eating for performance, not just meeting the requirements of the Canada Food Guide.

Monitoring (Sport science)

Working with a PET (nutritionist, psychologist and physiotherapist) should now come as second nature to the athletes. The physiotherapist will travel with the team when possible and other specialists like biomechanists, massage therapists, occupational therapists and video specialists may also assist at targeted competitions. The team uses computer programs such as Dartfish to perfect their technique and scout opponents and anti-doping education continues to be updated by the national coaching staff. Athletes may also have access to sport science support through national or provincial training centres, depending on where they live.



“It is essential to be healthy and strong to excel at sport, both physically and mentally. My focus, nutrition, exercise and balanced life all contribute
To great shots on the court.”

- Paul Gauthier, Paralympic Gold Medallist

Ancillary Capacities

Athletes in this stage are experienced and comfortable with international travel. They are capable of taking care of their own personal needs, transportation and other daily life skills.

A dedicated and trained sport assistant is a necessary part of the athlete's sporting life at this level and as such, their fitness and well being is very important. At international events they assist the athlete and manage their personal care every day for the entire trip, which can last up to three weeks.

While all the sports assistants are integral to the sport, some are particularly specialized as they assist directly on court with the athletes. These assistants are not just providing support for the athlete's personal care needs, they are a part of the sport team, and must

understand and fulfill this unique aspect of their role in order for the athlete to have an optimal performance.

Officials and Classification

Certified officials and classifiers will be at sanctioned national and international events. Classification is generally not as big an issue in this stage, as most athletes have confirmed classifications after two international competitions. There will be very few changes in classification except regarding athletes whose disabilities are not stable, such as some of the athletes in the BC4 class. These athletes may have to be reclassified from time to time.

The Active for Life stage can be entered at any time. Some athletes come into this stage after completing their high performance career, while others never compete and just enjoy the recreational side of boccia. In either case, staying involved in boccia will help athletes maintain their physical and mental health, and will also benefit the sport. The goal of this stage is to keep people involved in boccia for life.

As people with cerebral palsy and associated disabilities age, their gross motor skills can decline and they are at risk for a wide array of secondary disabilities including pain, balance issues, spasticity and decreased endurance¹. Weight gain and a more sedentary lifestyle are also problems for this group. Continued involvement in physical activity is one of the most effective tools a person with cerebral palsy or

associated disability has to maintain their health, and as a result, their independence.

Sports assistants should not be forgotten in this stage. Some sports assistants are with an athlete throughout that athlete's career. Once the athlete has retired, their sports assistant can remain involved in boccia as a coach, official or volunteer. Other sports assistants do not stay with an athlete for the long term, and could therefore enter this stage earlier.

With their intimate knowledge of boccia, both athletes and sports assistants are extremely valuable to the continued growth and development of boccia as mentors, coaches, officials and volunteers. Athletes and sports assistants in this stage should be recognized as priceless resources and potential leaders.

Objectives

Stay active, stay healthy, stay independent

Key outcomes

At the end of this stage, athletes have further refined the skills they acquired in Stages 1-6, and

- A smooth transition from their competitive career to lifelong physical activity and good health or, for recreation or open players, lifelong participation
- Exploring other outlets for their boccia skills such as becoming a coach or official
- Continued physical, social and mental health and independence
- Having fun playing recreational boccia

Technique

Develop or refine technique based on individual goals

Tactics/Strategies

Develop or refine tactics and strategies based on individual goals

Decision Making

Transfer decision making skills learned in boccia to decision making in life

Physical Preparation

It is suggested at this stage that athletes consult their physician and a professional personal trainer before starting a new physical activity program. Personalized

exercise programs that are goal oriented and address cardiovascular endurance, muscular strength and range of motion should be considered².

Equipment

Boccia related equipment should be matched to the athlete's ability level and goals. Beginner athletes, whether young or older, can use simple, beginner equipment. More advanced athletes will probably want personalized equipment. Personalized seating and mobility bases should undergo periodic review/scrutiny.

Coaching

At this stage the coaches should have completed

NCCP Community Initiation certification. It is important for coaches in this stage to be able to communicate effectively with an adult population as the coach will act as a facilitator and an advisor to the athletes, as opposed to a teacher.

Training (Volume & Focus)

Training should be adapted to the athlete's individual goals. Consideration should be given to the athlete's age and past sporting experience when designing training programs.

Competition

Athletes at this stage should compete in skill appropriate competitions at the provincial and national level. Consequently, PSOs and CCPSA should be encouraged to remember the value of these athletes and create appropriate divisions (i.e. Masters) for them.

Mental Preparation

Athletes transitioning from high performance careers to this stage should be encouraged to develop a transition plan with their coach and sport psychologist.

Nutrition

Athletes should be following the guidelines set out in the Canada Food Guide for Healthy Eating. Maintaining good eating habits will help athletes maintain their physical health and therefore their independence.

Monitoring (Sport Science)

In this stage, the athletes are no longer seen regularly by the CCPSA performance enhancement team. As a result, to ease their transition, they could consult specialists in psychology, kinesiology, personal training etc.

Ancillary Capacities

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, hydration and nutrition.

Officials

Athletes or sports assistants should be encouraged to consider training as a referee or classifier.

Where do we go from here?

The creation of this document is just the first step in implementing the principles of Long Term Athlete Development for boccia in Canada.

The model will be distributed and communicated widely to partners in all provinces. The principles of the model will be woven into the fabric of future CCPSA budgets and strategic plans.

In fact, this has already begun. In 2006, CCPSA successfully secured funding from Sport Canada for a

public awareness campaign, developed in partnership with PSOs, to promote boccia to parents of children aged 8-10 years old.

Some NSOs have changed the rules of their sport to support the implementation of LTAD, while others have dramatically revised how their sport is played at different stages. The boccia community has an opportunity to grow our sport unencumbered by numerous ingrained past practices that burden more established sports using a model that has international recognition.

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The word 'Canada' is written in a large, bold, serif font, with a small red and white Canadian flag icon positioned above the letter 'a'.

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Appendix A: Boccia Skill Chart

Note : The acquisition, consolidation and refining rates in this chart are based on participants with congenital cerebral palsy. Participants who have a degenerative condition or acquired disability will move through the same stages, but the rates may vary. These stages are also based on IDEAL ages. Older athletes who come late to boccia can still experience success at a high level and should be encouraged to participate.

A is for **Acquire** - when does the person learn the basics of the skill.

C is for **Consolidate** - when does the person know the basics and work on reinforcement.

R is for **Refine** - means the person has the skill and is now perfecting the details

A / C or C / R - Because the stages are several years long, it's likely the person will acquire and consolidate some skills in the same stage.

BOCCIA SKILLS	I/II	III	IV	V	VI	VII
Chronological Age	0-9	10-15	15-18	18-22	23-25	25-30
A. TECHNICAL						
Balance (Being able to deliver the balls without any risk)	A	C	R	R	R	R
Positioning						
Being able to physically position the chair	A	A / C	R	R	R	R
Choosing optimal position of chair in the throwing box			A	C	C / R	R
Body positioning	A	A / C	C	C / R	R	R
Knowing the angles		A	A / C	C	C / R	R
Learning and rehearsing shot sequence		A	A / C	C	C / R	R
Delivery skills						
<i>Note: method of ball delivery will partially depend on an athletes' level of disability. ALL athletes should try ALL skills when first starting to play. Coaches and athletes should work together to determine the most effective method of ball delivery for that player. Athletes who cannot throw can use a ramp to deliver a ball and should focus on the delivery skills needed for that method.</i>						
<i>General Skills</i>						
Breath control		A / C	R	R	R	R
Bending over and coming back up	A	C	R	R	R	R
Stablising trunk to provide stable base for accurate throwing	A / C	R	R	R	R	R
Using trunk to generate throwing force	A	C / R	R	R	R	R
Generating velocity		A / C	R	R	R	R
Aiming a ball	A / C	R	R	R	R	R
Timing release of a ball		A / C	R	R	R	R
Releasing a ball	A / C	R	R	R	R	R
<i>Throwing Skills</i>						
Grip (Holding the ball properly, finding the proper grasp)	A	C / R	R	R	R	R
Underhand throw	A / C / R	R	R	R	R	R
Overhand throw	A / C	R	R	R	R	R
Backswing	A / C	R	R	R	R	R
Kicking	A / C	C / R	R	R	R	R
Follow through	A / C	R	R	R	R	R
<i>Ramp skills (if applicable)</i>						
Head control for pointer use			A / C / R	R	R	R
Hand/Finger/Foot control for ramp use			A / C / R	R	R	R
B. TACTICAL						
<i>General Skills</i>						
Multi-shot planning				A	C	R
Shot risk assessment				A	C	R



Appendix A: Boccia Skill Chart

Shot risk management				A	C	R
Shot selection		A	A / C	C	R	R
Keeping track of managing playing time			A	C	R	R
Throwing shot to target	A	C	C	C / R	R	R
Concepts of offense and defense			A	C	R	R
Identify and correct technical errors			A	A / C	C	R
Applying the rules to your advantage			A	A / C	C	R
Determining when to call for the head referee			A	A / C	C	R
<i>Shots</i>						
Drawing		A	A / C	C	R	R
Busting		A	A / C	C	R	R
Lobbing		A	A / C	C	C / R	R
Bouncing		A	A / C	C	C / R	R
Ricochet/Rebound		A	A / C	C	C / R	R
Push/Bump		A	A / C	C	C / R	R
Block		A	A / C	C	C / R	R
<i>Combination Shots</i>						
Push to block			A	C	C / R	R
Push to score			A	C	C / R	R
Place and push			A	C	C / R	R
Place and ricochet/rebound			A	C	C / R	R
C. STRATEGIC						
Placing the jack		A	C	C / R	R	R
Choosing which set of balls to use before the game starts			A	A / C	R	R
Choosing which colour to use after the toss		A	C	C	R	R
Knowing the rules		A	C	C / R	R	R
D. DECISION MAKING						
Where to throw jack		A	C	C	R	R
Choosing which ball to throw during the game			A	C	C / R	R
Choose when to use which equipment (extension, towel etc.)			A	C	R	R
Assessing when to use techniques to increase/decrease arousal			A	C	C	R
Deciding when to protect to the lead		A	C	R	R	R
Deciding when to maximize points		A	A / C	C	R	R
E. PHYSICAL PREPARATION						
Flexibility	A	C	C / R	R	R	R
Muscular endurance	A	C	C	R	R	R
Cardiorespiratory Endurance	A	C	C	R	R	R
Strength	A	C	C	R	R	R
Power	A	C	C	R	R	R
Posture	A	C	C / R	R	R	R
Techniques to increase/decrease arousal (breathing etc.)			A	C	R	R
Speed			A	C	C / R	R



Appendix B: Ancillary Skill Chart

A is for **A**quire - when does the person learn the basics of the skill.
 C is for **C**onsolidate - when does the person know the basics and work on reinforcement.
 R is for **R**efine - means the person has the skill and is now perfecting the details
 A/C or C/R - Because the stages are several years long, it's likely the person will acquire and consolidate some skills in the same stage.

LTAD Stage	I/II	III	IV	V	VI	VII
Chronological Age	0-9	10-15	15-18	18-22	23-25	25-30
ANCILLARY CAPACITIES						
Nutrition						
• making sound nutritional choices	A	A / C	C	C	R	R
• foreign travel nutrition plan					A / C	R
• know Canada's Food Guide	A	C	C	C	R	R
Travel Skills						
• coordinate packing and preparing of all personal & sports equipment (wheelchair, ramp, medications, clothing etc.)			A	C / R	R	R
• arrange appropriate inoculations or other medical preparations for travel				A	C / R	R
Medico-Physical Upkeep						
• skin care		A	C	R	R	R
• know and follow medication prescriptions			A / C	R	R	R
• awareness of community resources		A	A / C	C	R	R
• know meds/labels/interactions			A	C	R	R
• awareness of effects of time changes on prescriptions				A	C	R
Recuperation/Regeneration						
• know how to stay hydrated		A	C	R	R	R
• awareness of personal physical status and needs		A	C	C	R	R
• sleep maintenance/jet lag strategies				A	C	R
• relaxation skills		A	C	C	C	R
• awareness of community health resources (massage therapy, sports psychology)		A	A / C	C	R	R
Relationships						
• Separate personal relationships from sport relationships		A	A / C	C	R	R
• recruit sport assistant			A	C	R	R
• select sport assistant			A	C	R	R
• training sport assistant			A	C	R	R
• manage sport assistants' functioning			A	C	R	R
MENTAL PREPARATION						
Social						
• assertiveness		A	C	C	R	R
• leadership skills		A	A / C	C	C	R
• communication skills	A	C	C	C	R	R
• sportsmanship	A	C	R	C / R	R	R
• team player	A	C	C	R	R	R
• confidence in social situations	A	C	C	C	R	R
Emotional						
• self-confidence	A	C	C	C	R	R
• poise/control of emotions		A	C	C	R	R
• adapts to change	A	A / C	C	C	R	R
Cognitive						
• learn from observing others	A	C	C	R	R	R
• goal setting		A	C	R	R	R
• time management		A	C	R	R	R
• mental imaging/focus		A	A / C	C	R	R
• evaluating advice			A	C	R	R



Physical, Mental and Cognitive, and Emotional Development Characteristics

The following Moving Scales provide a guideline on how to utilize the Physical, Mental, Cognitive and Emotional Development Characteristics tables, pointing out the overlaps at the various stages of LTAD.



Late Childhood - Physical Development

Basic characteristics	General impact on performance	Implications for the coach
Heart size is increasing in relation to rest of body.	Endurance capacity is more than adequate to meet the demands of most activities.	Understand that the child has the capacity to keep going.
Anaerobic system is not developed.	There is a limited ability to work anaerobically.	Plan short duration anaerobic activities. The ability to hold breath must be practiced and built up gradually.
A child's metabolism is less economical than an adult's.	Children use more oxygen whether it's expressed in absolute values or prorated for body weight.	Do not expect younger children to keep up with older children.
Large muscle groups are more developed than smaller ones.	The child is skilful in movement requiring the use of the large muscle groups.	Emphasize the development of general motor skills involving the large muscle groups. Then gradually introduce more precise, co-ordinated movements requiring the interaction of smaller muscle groups.

Appendix C: Physical, Mental and Cognitive, and Emotional Development Characteristics

Basic characteristics	General impact on performance	Implications for the coach
Children have a shorter tolerance time for exercise in extreme temperatures.	Children may show symptoms of overheating or hypothermia more quickly.	To acclimatize children will take longer so longer warm-ups may be required. Watch closely for signs of distress caused by extremes of temperature.
Children subjectively feel able to be active in the heat before physiological adaptation has occurred.		Postpone or restrict exercise in heat or humidity and ensure that plenty of fluids are ingested. Thirst is not a good indicator of fluid need.
Motor patterns become more refined and the balance mechanism in the inner ear gradually matures.	Great improvement in agility, balance, co-ordination, and flexibility occurs towards the end of the stage.	Emphasize co-ordination and kinaesthetic sense when doing activities. Balance in the water using buoyancy aids is one way to develop these abilities.
Strength develops by the improvement in the neural pathways.	There is apparent improvement in strength not brought about by the neuro-muscular adaptations of muscle fibres.	Plan coordination activities.

Late Childhood - Mental and Cognitive Development

Basic characteristics	General impact on performance	Implications for the coach
The attention span gradually increases.	Children cannot listen or stay still for long periods.	Provide short and precise instructions. Devise strategies to ensure children are listening. Children learn well by imitating and practicing correctly-modelled movements.
Children are enthusiastic and often impatient.	Children want to move and not listen.	Do not bombard children with technical information. Give only sufficient detail for the activity to be undertaken. Keep the fun.
Children have very limited reasoning ability.	Children love to be led.	Direct the training and give it a tight focus with activities that are fun and well planned. Introduce imaginative ways of achieving performance goals.

Appendix C: Physical, Mental and Cognitive, and Emotional Development Characteristics

Basic characteristics	General impact on performance	Implications for the coach
Children enjoy the repetition of activities and improve through experience.	Skill learning must be directed; children do not learn correctly just by trial and error.	Provide correct demonstrations of the basic sport skills. Personal demonstrations must be accurate.
Children establish their preferred learning style.	Learning is through verbal, visual, or manual means. Most children are doers!	Use a variety of learning styles to suit individual needs.
Imagination is blossoming.	Creativity should be encouraged.	Allow the children to play and experiment. Use their ideas to create exciting sessions. Structure to encourage individuality and creativity. Sport provides an excellent vehicle for expression.
Language skills may be limited but are improving.	Children can't make corrections to their performance unless they understand what is being asked of them.	Use terminology that can be easily understood. Gradually introduce technical terminology. Children love long words.

Late Childhood - Emotional Development

Basic characteristics	General impact on performance	Implications for the coach
Children like to be the centre of attention.		Develop this characteristic. Plan activities that guarantee success. Always move from simple to more complex when teaching a skill movement. Allow children to show their skills.
Children are developing their self concept.	Children tend to evaluate their performance as a whole and in terms that may be black and white. (I was brilliant, or, I was useless.)	Provide positive reinforcement to build self- esteem. Children are likely to perform the actions again if they are successful and feel good about it. Build on success.
Children feel secure with a routine and structure to training.	Introduce change sensitively and gradually.	Build a structure that is progressive but maintains continuity.
Children feel secure when coaching is constant.	Children like things to be fair.	Set and maintain high levels of expectancy, but be consistent with each child. Do not let mood swings or personal situations change coaching behaviours.

Appendix C: Physical, Mental and Cognitive, and Emotional Development Characteristics

Early Adolescence - Physical Development

Basic characteristics	General impact on performance	Implications for the coach
Significant proportional changes occur in bone, muscle, and fat tissue.	Athletes may temporarily lose some of their kinaesthetic awareness, their ability to 'know where they are'.	Because athletes will need to constantly change their positions, monitor carefully to ensure appropriate adaptations are being made.
Different parts of the body grow at different rates. Arm and leg length increases before the trunk.	Athletes may appear gangly and lose control of their extremities.	Make athletes aware of the effect of their changing body shape. Skills already refined may need to be re-learned.
Decreases in flexibility result directly from growth.	Movement may become restricted.	Emphasizes low stretching exercises.
Increases in growth and decreases in flexibility make adolescents prone to injury from acute impact.	Injury can result from exercise of an acute nature such as forced elongation of muscles during kicking and jumping or from overuse.	Vary land-based activities and activities to avoid overuse.
Girls begin their growth spurt between 10 and 14 years and grow at very different rates.	Athletes are very different sizes at the same age.	Be aware that age-related groupings may not be appropriate.
There is a significant increase in the production of red blood cells.	The oxygen transportation system is improved.	Introduce structured aerobic training to make the most of these changes. Only short duration anaerobic training is recommended.
The central nervous system is almost fully developed.	Agility, balance, and co-ordination are fully trainable.	Use this period for maximum improvement in skill development.
Abstract thinking becomes firmly established.	Adolescents should be part of decision-making processes and be more responsible for their decisions.	Base decision making for strategies on skill level.
A new form of egocentric thought develops.	The result may be a strong fear of failure.	Plan for success. Introduce coping strategies, including mental imagery.
Young people are eager to perfect their skills.	Structure successful skill learning based on individual needs.	Build on success. Be aware that athletes develop at very different rates and although early developers make early progress, include all athletes. Be aware that late developers may have greater potential.

Early Adolescence - Emotional Development

Basic characteristics	General impact on performance	Implications for the coach
Physical, mental, and emotional maturity may not develop at the same time.	Athletes who look mature may not act it. Confusion or anxiety may arise.	Develop communication skills and understanding.
Tensions may arise between adults and adolescents.	Adolescents need help to cope with their physical and emotional changes.	Ensure two-way communication channels are always open. Allow athletes input into the decision making.
Hormonal activity increases.	Athletes may experience mood swings and behaviour may change.	Communicate and accept changes, but don't let hormonal changes be an excuse for negative behaviour.
Social interaction between males and females becomes important.	Athletes want to form friendships and it is important to allow time for them to develop positive relationships.	Try to organize social events that allow social interaction.

Late Adolescence - Physical Development

Basic characteristics	General impact on performance	Implications for the coach
Post-menarche height begins to stabilize. Increase in height is about 5%. Stabilization of muscular system also occurs.	Muscles have grown to mature size, but increases in muscular strength continue into the 20s.	Maximize strength training to bring about overall improvement. Optimize neuromuscular training.
Skeletal maturation continues.	Connective tissue is strengthening.	Continue progressive overloading in training.
By 17, girls have generally reached adult proportions.	Girls proportionately gain more weight during this period.	Optimize aerobic training. Be aware of how to deal with weight gains. Teach athletes how to compete in varied circumstances.
Rate of improvement in motor ability declines.	Rate of improvement in skill development declines.	Be aware that the rate of improvement in motor ability will be slower, but improvement will still be made.

Appendix C: Physical, Mental and Cognitive, and Emotional Development Characteristics

Late Adolescence - Mental and Cognitive Development

Basic characteristics	General consequences for performance capabilities and limitations	Implications for the coach
Generally by 16, the brain has reached adult size, but continues to develop neurologically.	Athletes can understand the technical requirements of their sport.	Make sure athletes understand why they are doing certain things.
Critical thinking becomes more established.	Athletes can make decisions about their training pathway.	Allow athletes input and reduce the amount of feedback and make athletes think for themselves. Develop awareness of performance by increasing kinaesthetic knowledge.
There should be complete understanding and acceptance of the need for rules, regulations, and structures.	Rules are seen in simplistic terms and must be clear and well defined.	Always be seen to be fair because adolescents have a strong sense of fairness in making decisions. Make athletes part of the decision-making process.

Late Adolescence - Emotional Development

Basic characteristics	General impact on performance	Implications for the coach
Major decisions about examinations, universities, and employment work have to be made.	There are 'pulls' on time and energy.	Build in prophylactic breaks. Be aware of external pressures. Seek professional guidance to ensure the correct career and educational pathway.
Peer group pressure leads to conflicting loyalties.	An athlete may give up sport because of peer pressure and the need to be seen as one of the gang.	Be sensitive in goal setting to ensure that common goals are established and met.
Self-actualization and self-expression are important.		Treat athletes as adults. Share goals and work co-operatively towards them. Maintain a coach-led structure.
Interactions with friends of both sexes continue to be a strong priority.		Allow time to establish independent social interaction.

Early Adulthood - Physical Development

Basic characteristics	General impact on performance	Implications for the coach
Physiologically, the body reaches maturity during this stage.	All physiological systems are fully trainable.	Ensure that physical training programs employ the most advanced techniques and sport science information to facilitate maximum adaptation and minimize injuries.
		Ensure that all muscle groups and body alignments are well-balanced, complemented with optimum flexibility ranges.
		Use state-of-the-art testing and monitoring programs.
		Carefully monitor overtraining and overstress.
Final skeletal maturation in females occurs at about 19-20 years and in males about 3 years later.		Organize regular medical monitoring Schedule additional blood tests for females in case of anemia.

Early Adulthood - Mental and Cognitive Development

Basic characteristics	General impact on performance	Implications for the coach
Neurologically, the brain matures about 19-20 years of age.	Athletes are capable of self-analyzing and correcting and refining skills. Athletes can analyze and conceptualize all facets of their sport.	Establish winning as the major objective.
	Well-developed information processing skills improve the athlete's ability to visualize verbal instructions.	Implement principles of adult learning.
There is a complete understanding and acceptance of the need for rules, regulations, and structure.	The young adult must perceive the rules and structure as being clearly defined and fair.	Involve athletes in decision making and planning team or group activities.

Appendix C: Physical, Mental and Cognitive, and Emotional Development Characteristics

Early Adulthood - Emotional development

Basic characteristics	General consequences for performance capabilities and limitations	Implications for the coach
There is a need to be self-directed and independent.	Athletes are ready to assume responsibility and accept the consequences of their actions.	Emphasize goal setting to give definite direction and purpose to the athlete's overall program.
Self-actualization and self-expression are important.		Treat athletes as adults and with respect. Remember that the coach's direction and structure remain important.
Major decisions on career, education, and lifestyle are priority at some point in this stage.	Major changes in interests, hobbies, and physical activities occur.	Make professional guidance available, considering off-season and educational pursuits.
Interactions with the opposite sex continue to be a strong priority with lasting relationships developing.		Provide athletes with ample opportunities for independent social interaction.



Before pursuing the stages of Long Term Athlete Development for boccia, the LTAD committee identified some issues which needed greater clarification.

1. Do the early stages of LTAD mean anything to us? The No Accidental Champions document added two new stages, “Awareness” and “First Contact” to recognize that the period following diagnosis or acquisition of a disability is one of great transition and change. This addition was helpful but the Committee needed to study how these two stages plus the other early LTAD stages applied to boccia players.
2. When are our participants introduced to the activity and how do they discover the sport of boccia? It was the notion of the Committee that these individuals were not inculcated into sport to the same degree or in the same fashion as other members of Canadian society. As a result, sport never was regarded as an option by them. In many cases they were encouraged to do little and to allow others to look after their needs which included very little activity or recreation. Definitely this assumption needed study.
3. There are a number of benchmarks or windows which are critical in LTAD particularly able bodied LTAD. Two of these, for example, are peak height velocity relative to boys and the onset of menses relative to girls. Were these and other maturation markers significant to boccia participants? Certainly maturation occurs in these individuals. But are there any differences relative to age? And even more importantly, do they have anything to do with making better boccia players?
4. It was critical to understand the importance of and the role played by other institutions within our provinces/territories. Schools, for example, play an important role in early introduction to movement and sport. But what about children with cerebral palsy and related disabilities? The system in Ontario and British Columbia educated our participants in integrated settings. In other words, they were mixed with other children in local schools. Using the schools as a means of reaching our perspective athletes would be more difficult in Ontario and BC than in Quebec, for example, where children with cerebral palsy and other

related disabilities attend special schools. The Committee believed that this fact alone would affect the approach of the provincial organizations responsible for recruiting candidates. We needed to know what particular issues were presented to our provinces/territories if our plan was to be comprehensive and practical.

5. There were different approaches to the delivery of sport in the provinces/territories. Although each region of the country delivered sport partially through the services of a provincial sport organization (where there was one), there were regional variations. Many provinces relied upon disability specific organizations to serve these athletes. The Ontario Cerebral Palsy Sport Association, for example served those individuals with cerebral palsy, head injury and stroke. Other regions (Prince Edward Island) appeared to be utilizing a multi sport approach by serving all athletes with a disability through a Provincial Paralympic Organization. Others like New Brunswick reported an integrated approach. The whole concept of “integration’ has many definitions and needs serious examination as a delivery process. The Federal Sport Organizations have recognized that their sport mandate is to include all citizens participating in that particular sport. Some are further along in the recognition of this mandate than others. The sport of boccia, however, is a sport specific to participants with a disability. If Long Term Athlete Development belongs in part to the provinces/territories, who will partner with CCPSA to support local/community needs?

6. Another issue related to the symbiotic relationship between recreation and sport. Because boccia clubs tend to be small in numbers they fulfill both the recreational needs and sport desires of its members. When one considers the expectations of performance in high performance sport, can these expectations be delivered by clubs whose mandate is often defined as recreation? It is clear that many who play in the recreational setting will not be eligible to clear classification when it comes to international participation in boccia. The committee needed to understand, more clearly, the mandate of the provincial clubs. Can community recreational goals and the goals of high performance be reconciled?

Appendix D: LTAD & Boccia Key Issues

In order to more clearly understand the issues like those described above the LTAD Committee decided the following:

1. In order to obtain a better picture of the process of development for the athletes currently participating in boccia, a survey of current players would be conducted.
2. Members of the LTAD Committee would complete focus group meetings with at least three members representing provincial affiliates in order to understand better the role played by the provinces relative to boccia participation. We would also gain important information about what the provinces saw were unique challenges to their particular situation. Attending for the provinces would be a board member, an athlete, a staff member, a coach and official. At least two members of the committee would attend. The three provinces chosen were Quebec, Ontario and British Columbia.
3. The LTAD Committee would assign specific members to research the literature for data pertinent to athletes who play boccia particularly in relation to growth and development, fitness and technical/biomechanical issues.

The LTAD Committee itself would subdivide its members relative to the various stages of athlete development and, in this way; each member would become more familiar with that particular aspect of athlete development.



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