



Long-Term Athlete Development



**“The pursuit
of excellence and
an active lifestyle”**

Table of Contents

Acknowledgements.....	5
Glossary of Acronyms	6
Glossary of Terms	7
Introduction.....	11
A Systematic Review of Water Polo Canada	15
Sensitive Periods of Trainability.....	21
Periodization	26
Physical Literacy	28
Stages of Long-Term Athlete Development	32
Active Start.....	36
I Love Water Polo	37
Competitive Foundations	43
Training to Compete	49
Training to Perform.....	55
Living to Win	61
Active for Life	67
Training and Competition	69
Implementation of Long-Term Athlete Development.....	74
Conclusion	76
Selected Bibliography	77
Appendix 1 : Physical, Mental and Cognitive, and Emotional Development Characteristics	80
Appendix 2 : Single, Double, and Triple Periodization Models	88
Appendix 3 : Water Polo Canada Long-Term Athlete Development Framework Matrix.....	91

Table of Illustrations

Table 1 - Stages of Water Polo Long-Term Athlete Development.....14

Table 2 - Number of Registered Members – 1990-200815

Table 3 - Number of National Club Championship Entries – 1989 to 200816

Figure 1 - Maturation in Females and Males.....22

Figure 2 - Maturity Events in Females.....22

Figure 3 - Maturity Events in Males.....22

Figure 4 – Variation in Trainability24

Figure 5 – Windows of Optimal Trainability25

Table 4 – Phases of an Annual Plan – Single and Double Periodization26

Table 5 – Objectives of Periodization Phases27

Table 6 – Who is Responsible for Physical Literacy.....28

Table 7 – Learning Fundamental Movement Skills29

Table 8 – When and Where Children Learn and Practice Fundamental Movement Skills.....30

Figure 6 – Physical Literacy Leads to an Active Life31

Figure 7 – Tiered Competition Diagram.....32

Figure 8 – Participation in Life-long Physical Activity33

Figure 9 – Optimum Learning Environment.....36

Table 9 – Variety of Fundamental Movements and Skills that Underpin Physical Literacy.....40

Figure 10 – Circle of a Physically Active Life67

Table 10 – Optimal Training to Competition Ratios.....70

Table 11 – Trident Training.....71

Figure 11 – Trident Training Pie Charts72

Acknowledgements

Water Polo Canada acknowledges the financial support of the Government of Canada through Sport Canada, a branch of the Department of Heritage Canada.

Water Polo Canada would like to thank the following key individuals for their contributions to the research, development and preparation of the Water Polo Canada Long-Term Athlete Development pathway: Istvan Balyi, Charles Cardinal, Gabor Csepregi, Ahmed El-Awadi, Cyndie Flett, George Gross JR, Roy Gunnell, David Hart, Dragan Jovanovic, Heather Kaulbach, Jeffrey Lindell, Sandra Lizé, Patrick Oaten, and John Stockdale.

Water Polo Canada would also like to thank the following individuals for their commitment to the growth of water polo in Canada, and the various contributions they have made in the preparation of this document: Deanna Barry, Paul-David Bernard, Alain Delorme, Jymmi Kaye Demchuk, Marie-Claude Deslières, Jef Ekins, Pierre Fiset, Paula Fisher, Francis Gross, Dave Hill, Pierre Langlois, Ross Macdonald, Mike Mortin, Clem Pelot, Paul Pottier, Julie Quenneville, Celso Rojas, Jean Thomas, Marilyn Thorington, Scott Smith, Annette Wildgoose.

Finally, Water Polo Canada would like to thank the coaches, officials, administrators, volunteers, and athletes who give their time, energy, and passion to the sport of water polo.

Thank you.

Glossary of Acronyms

- 10U 10 years old and younger
- 12U 12 years old and younger
- 14U 14 years old and younger (formerly Bantam)
- 16U 16 years old and younger (formerly Cadet)
- 18U 18 years old and younger (formerly Youth/Juvenile)
- 20U 20 years old and younger (formerly Junior)
- 22U 22 years old and younger
- ABCs Agility, Balance, Coordination, and Speed
- BOD Board of Directors
- CEGEP Collège d’Enseignement Général et Professionnel/College of General and Vocational Education
- CIS Canadian Interuniversity Sport
- DDD Domestic Development Director
- FINA Fédération International de Natation
- FISU Fédération International de Sport Universitaire
- FMS Fundamental Movement Skills
- ILWP I Love Water Polo
- JRNT Junior National Team
- KGBs Kinaesthetic, Gliding, Buoyancy, and Striking with the body
- LTAD Long-Term Athlete Development
- MMA Major Metropolitan Areas (Vancouver, Calgary, Toronto, Ottawa, and Montreal)
- NCC National Club Championship(s)
- NCAA National Collegiate Athletic Association
- NCCP National Coaching Certification Program
- NSO National Sport Organization
- NT National Team(s)
- OWP Ontario Water Polo
- PE Physical Education
- IST Integrated Support Team
- PRO Parks and Recreation Ontario
- PSO Provincial Sport Organization
- RJT Running, Jumping, and Throwing
- PCKs Passing, Catching, Kicking, and Striking with an implement
- PHV Peak Height Velocity
- PSV Peak Strength Velocity
- VIP Very Important Person
- WPC Water Polo Canada

Glossary of Terms¹

The 5 Basic Ss of Training and Performance are Stamina (Endurance), Strength, Speed, Skill, and Suppleness (Flexibility).

Active recovery is the use of a low heart rate movement while recovering from a high intensity exercise.

Active rest refers to the use of others sports, or low heart rate activities, during the rest phase of the macrocycle.

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.

Aerobic energy system refers to the muscle energy system that requires oxygen. It does not produce fatigue producing waste products (ie lactic acid). This system is used in lower intensity activities. An aerobic activity last for a period of more than 2 minutes.

Anaerobic alactic energy system refers to the start up energy system that does not require oxygen and does not produce lactic acid. An anaerobic alactic activity lasts for a period of 10 seconds or less.

Anaerobic lactic refers to the start up energy system that does not require oxygen and does produce lactic acid. An anaerobic alactic activity lasts for a period of 10 seconds to 2 minutes.

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

Block learning refers to a controlled learning environment.

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.

¹ Balyi I., Cardinal C., Higgs C., Norris S., and Way R. Long-Term Athlete Development - Canadian Sport for Life, 2005.

Chronological age refers to the number of years and days elapsed since birth. Growth, development, and maturation operate in a time framework – 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 two decades of life.

Competition is defined as all sanctioned (league, tournament, National Club Championships, etc.) and non-sanctioned (exhibition, joint training, etc.) games, scrimmages, power play/penalty kill, counter attack scenarios, and game scenario drills.

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. 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.

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

Dry land is defined as core/stability and weight training outside of the water.

Eustress is refereed to as positive physical stimuli.

Frequency refers to the number of workouts within a given time frame, usually per the microcycle. Frequency relates to the loading period within the mesocycle

Game scenario is defined as a situation where technical skills are incorporated into a setting where the athlete is forced to make a pressured decision with multiple options.

The terms “**growth**” and “**maturation**” are often used together and sometimes synonymously. However, each refers to specific biological activities. Growth refers to observable, step-by-step, 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.

Intensity is the qualitative component of the training regimen. Intensity is measured through heart rate and contains all activities within a given unit of time.

Loading to recovery ratio refers to the number of microcycles within a mesocycle. Loading means increasing volume, while recovery is a lowering of volume and increase of intensity.

Macrocycle is commonly referred to as the training period in question and is divided into distinct phases. A typical macrocycle lasts for a period of 12 months.

Mesocycle reflects specific training emphasis relating to a change of volume and intensity of training for that phase of training. A typical mesocycle lasts for a period of 3-4 weeks.

A **microcycle** lasts for a period of 7 days. The number of recovery microcycles determines the length of the mesocycle. For example, a 4-week mesocycle would entail three weeks of increasing intensity with one week of lower intensity (creating a loading to recovery ratio of 3:1)

Passive rest refers to no physical or mental training during the rest phase of the macrocycle.

Peak height velocity (PHV) is the maximum rate of growth in stature during growth spurt. The age of maximum velocity of growth (i.e. the period where an individual’s growth is most accelerated) 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.

The concept of **periodization** centres on time management – it is the process of varying a training program at regular time intervals to produce peak performance for a specific competitive event.

Physical literacy is the development of fundamental movement skills and fundamental sport skills that permit a child to move confidently and with control in a wide range of physical activity, rhythmic (i.e. dance), and sport situations. Physical literacy also includes the ability of individuals to “read” what is going on around them in an activity setting and react appropriately to those events. This developmental stage takes place between the ages of 0 and 12.

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

Puberty refers to the point at which an individual is sexually mature and able to reproduce.

Random learning refers to a learning environment that simulates competition realities.

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.

Sensitive period of development refers to points in the development of specific capacities when training has an optimal effect. Factors such as readiness and critical periods of trainability during growth and development of young athletes, where the stimulus must be timed to achieve optimum adaptation with regard to motor skills, muscular, and/or aerobic power, also influence these sensitive periods of development.

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 in respect to shape and position to one another rather than size.

Swimming is defined as lap swimming with goggles.

Trainability refers to the faster adaptation to stimuli and the genetic endowment of athletes as they respond to specific stimuli and adapt to it accordingly. Trainability refers to the responsiveness of developing individuals to training stimulus at different stages of growth and maturation.

Training is defined as goggle swimming, core/stability and weight training, and technical water polo skill development.

Training age refers to the age where athletes begin participating in regular, planned, and goal-oriented training. An athlete's training is influenced by the his or her developmental status – individuals who mature at an early age have a major advantage over average or late maturers during the Competitive Foundations stage. However, after all athletes have gone through their growth spurt, late maturers often exhibit greater potential to become top athletes provided they experience quality coaching throughout their development.

Water polo training is defined as technical skill development such as routines/water polo swimming with and without the ball, passing, shooting, etc.

Windows of optimal trainability refers to the sensitive periods of accelerating adaptation to training, which occurs prior to, during, and early post-puberty. During sensitive periods, the window for optimal training is fully open. This window remains open outside the sensitive periods, ensuring that there is always an opportunity for training and development.

Volume is the quantitative component of the training program. The volume of activity is defined by the duration (i.e. length of time) and/or length of the exercise (i.e. distance).

Introduction



The game of water polo is one of five aquatic sports recognized by the Fédération Internationale de Natation (FINA), which is the international governing body of all the aquatic sports (water polo, swimming, open water swimming, diving, and synchronized swimming)². The current form of water polo is played by participants of all ages and both genders. The rules of the game vary depending on the age group of the participants, however most countries with organized water polo programs follow the widely accepted FINA rules.

The underlying goal of water polo is to score on your opponents while preventing those same opponents from scoring on your team. Men play in a pool with a field of play that is 30 metres in length, 20 metres in width, and 3 metres in depth, while women play in a pool with a field of play that is 25 metres in length by 20 metres in width by 3 metres in depth. The game is played between two teams wearing distinctively coloured water polo caps (i.e. blue and white). Water polo caps are bathing caps with protective ear pieces that feature unique numbers from 1 to 13 for each player. A typical FINA-style game is played over four eight-minute quarters, with 2-minute breaks between the first and second quarters and the third and fourth quarters, and a 5-minute break between the second and third quarters (i.e. half-time). To ensure brisk play, the game is governed by a 30-second possession (or

shot) clock which requires each team to shoot at their opponent's goal within 30 seconds of receiving the ball. Failure to complete a shot within 30 seconds results in forfeiture of the ball.

Each team fields seven players at a time in the water, one of which is the goaltender (who wears a red cap to distinguish him/her from the other players). Each team is composed of a maximum of 13 players and 3 bench staff (i.e. Head Coach, Assistant Coach, Manager, etc.). Two referees stand on either side of the pool and follow the action up and down the length of the pool, officiating the game. Infractions to the rules are noted by the referees, who can award minor fouls (which result in free passes) or major fouls (which result in a 20 second penalty to the offending party).

Water polo's roots can be traced back to 19th Century Great Britain where the game was first developed. Early play allowed brute strength, wrestling and holding opposing players underwater to recover the ball. By the 1880s, the game evolved to include fast-paced team play with a soccer-sized ball that emphasized swimming, passing, and scoring. Between 1890 and 1900, the sport grew in Europe, with teams competing in Germany, Austria, France, Belgium, Hungary and Italy following British rules. Men's water polo was among the first team sports introduced at the 1900 Olympic Games along with cricket,

² For more information on FINA, please visit www.fina.org/project/.

rugby, soccer, polo, and rowing. In 1929, an international water polo committee consisting of representatives from Great Britain and FINA was formed to develop rules for international matches, which were put into effect in 1930. Women's water polo became an Olympic sport at the 2000 Sydney Olympic Games³.

Canada has a rich history of water polo play, tracing back over 100 years. In 1907, Water Polo Canada hosted one of the first Canadian club sport championships in the senior men's category. Since that time, teams and clubs have sprung up across the country, a number of which have enjoyed success in national and international competitions. Between 1907 and 1947, teams from Montreal dominated the senior men's national competitions. Since then, however, clubs from all corners of Canada have enjoyed success at national competitions. At the 100th anniversary of the senior men's National Club Championship (NCC) in Calgary, the Hamilton Aquatic Club won a record 21st Senior National Club Championship.

Through the years, competition has grown to include younger men's teams and female club competition. Women's water polo emerged on the national stage in 1977. Over the first ten years of national competition, the Ste-Foy Hydres won the senior women's National Club Championships eight times. Since then, competition across the country has become more balanced. CAMO (a Montreal based aquatic club that includes water polo, diving, swimming, and synchronized swimming) holds the most senior women's championships with 14.

The first National Club Championship for Junior men (20 years and younger) was held in 1927. The men's 18 years and younger category was introduced in 1985, along with the junior women's category. A National Club Championship for women 18 years and younger was incorporated into the Water Polo Canada National Club Championships in 1987, with championships for men and women 16 years and younger introduced in 1995.

³ History of Water Polo, Wikipedia, http://en.wikipedia.org/wiki/History_of_water_polo.

Today, National Club Championships are hosted annually for all levels of competition. In 2009, the Masters category (male and female specific 30 and older and 40 and older) was introduced. The name of the Masters event is now called the Water Polo Canada International Masters Water Polo Festival. As a result, water polo has expanded its presence in Canada considerably over the past 100 years.

In the 1970s and 1980s, Water Polo Canada had its first National League – the Canadian Water Polo League – for senior men. This league folded in the early 1990s. Over the past decade, however, two new leagues emerged – the Canadian Select League (CSL) and the Major League Water Polo (MLWP). The Canadian Select League was formed in 2005 as the premier women's water polo league, and is used as an evaluation tool for the Women's National Team. The Major League Water Polo was created in 2009 as a club development initiative for men and women.

Over the years, Canadian teams have enjoyed success in international competitions. The Canadian Men's National Team competed at the 1972 Olympic Games in Munich, the 1976 Olympic Games in Montreal, and 1984 Olympic Games in Los Angeles. For the first time ever, the men's team earned a spot for the 2008 Olympic Games in Beijing through the Olympic Qualification tournament. In previous Olympic Games, Canada was able to participate as a host (1976) or because other teams withdrew from competition (1972 and 1984). The Canadian men's team's most recent accomplishment was an 8th place finish at the 2009 FINA World Aquatic Championships in Italy, which marked the best international result in Canadian men's water polo history. The Canadian women's teams have competed in two of the three Olympic Games where women's water polo has been included – the 2000 Olympic Games in Sydney and the 2004 Olympic Games in Athens. Recent successes for the women's team include a silver medal at the 2009 FINA World Aquatic Championships in Italy and a silver medal at the 2009 FINA World League Super Finals in Russia.

The senior men's program is led by ex-Yugoslavian National Team goaltender Dragan Jovanovic, while ex-Canadian

National Team driver Patrick Oaten leads the senior women's program. Both men have led successful water polo programs for Canada in international competition. However, to ensure continued success in international competitions, Water Polo Canada has recognized the need to develop a stronger domestic infrastructure that retains participants and builds a culture of excellence.

Research in the field of excellence has demonstrated that an individual's superiority in an activity is in part the by-product of repetition and accumulated time spent practicing the activity⁴. In *Outliers*, the New York Times bestselling book about extraordinary individuals who have achieved greatness, Malcolm Gladwell articulates this as the "10,000-Hour Rule,"⁵ noting that it takes a minimum of 10 years and 10,000 hours of training for a talented athlete to reach high-performance levels. This translates into slightly more than 3 hours of training or competition daily for 10 years. The "10,000-Hour Rule" to produce excellence is a cornerstone of Water Polo Canada's Long-Term Athlete Development program.

Long-Term Athlete Development is a process that takes participants from playground to podium and beyond. This growth is achieved through segmenting age groups based on the physical, mental, emotional, and cognitive development of individuals. The Long-Term Athlete Development program optimizes the competition structure for the various stages of an athlete's development to ensure that optimal training, competition, and recovery programs are provided throughout a participant's career. Long-Term Athlete Development attempts to achieve this by integrating high-performance sports, community sport and recreation, scholastic sport, and physical education in schools. It is important to note that Long-Term Athlete Development has a dual purpose – while it ultimately prepares athletes for international competition, it is also focussed on developing individuals who participate in sport for life as athletes, coaches, volunteers, and

⁴ Ericsson, K.A., Krampe, R.Th. and Tesch-Romer. The role of deliberate practice in the acquisition of expert performance. *Psychological Review*, 1993.

⁵ Gladwell, M. *Outliers: The Story of Success* (Little Brown and Company, New York: 2008) 35.

officials. In essence, Long-Term Athlete Development offers an operational framework for clubs, communities, Provincial Sport Organizations, and the National Sport Organization to structure competition and age groupings based on developmental age, and optimize playing and training opportunities for all skill and commitment levels at any age.

The following pages contain a thorough review of the current state of water polo in Canada, including the identification of inherent problems and issues with the current system, and the development of a water polo specific Long-Term Athlete Development pathway to address these concerns. Through this analysis, it will become apparent how developmental age, trainability, and periodization affects each stage of an athlete's development, taking into account physical, mental and cognitive, and emotional development characteristics. Like many Canadian sports, water polo offers a competition and training structure that does not consider the biological age of athletes and their periods of optimal trainability. Moreover, the current competition structure was developed on an ad hoc basis, and lacks system alignment. The Long-Term Athlete Development pathway model provides the framework for a competition structure that fosters participation, competition and athlete development.

At the heart of this proposal is a desire to improve upon the current structure governing water polo in Canada. To further develop the sport in this country, we need to introduce a program and structure that attracts athletes from a young age and encourages them to stay involved in the sport through adulthood, either as athletes, coaches, officials or volunteers. To raise our international profile, we need to do a better job of identifying and developing high-performance athletes from a young age. To achieve this, we need to increase participation in water polo, and develop future coaches, club presidents, officials and volunteers. In examining program excellence in sport and water polo programs in other nations, it is apparent that the principles governing Long-Term Athlete Development pathways hold great promise for Canadian athletes and the future of this sport in Canada.



Table 1 - Stages of Water Polo Long-Term Athlete Development

Active Start
I Love Water Polo FUNdamentals
I Love Water Polo Technical Foundations
Competitive Foundations
Training to Compete
Training to Perform
Living to Win
Active for Life

While the idea of winning is reflected only in the latter stages of the Long-Term Athlete Development pathway (Training to Perform and Living to Win), that does not mean that the concept of winning is only applicable at these stages. During the earlier stages of the pathway, coaches must focus on skills development to produce winning teams, and not the final outcome. During these early stages, athletes are acquiring the skills it takes to be successful. However, it is important to note that winning is a skill that cannot be learnt overnight. As a result, winning should not be a formal goal at earlier stages of development, but competition should build toward winning as an athlete progresses through the stages of the Long-Term Athlete Development pathway.

A Systematic Review of Water Polo Canada

For water polo to become mainstream in Canada, a number of issues must be addressed. Despite recent international success (the men's 8th place and women's 2nd place finishes at the 2009 FINA World Aquatic Championships in Rome), the domestic water polo scene does not reflect these successes. Participation is down, regional disparity is an issue, lack of competition is impairing development, and administration remains an impediment to future growth. Our future international achievements and ability to attract funding are dependent upon our ability as an organization to work together from coast to coast to achieve meaningful progress.

The following factors are currently impacting the success of Water Polo Canada:

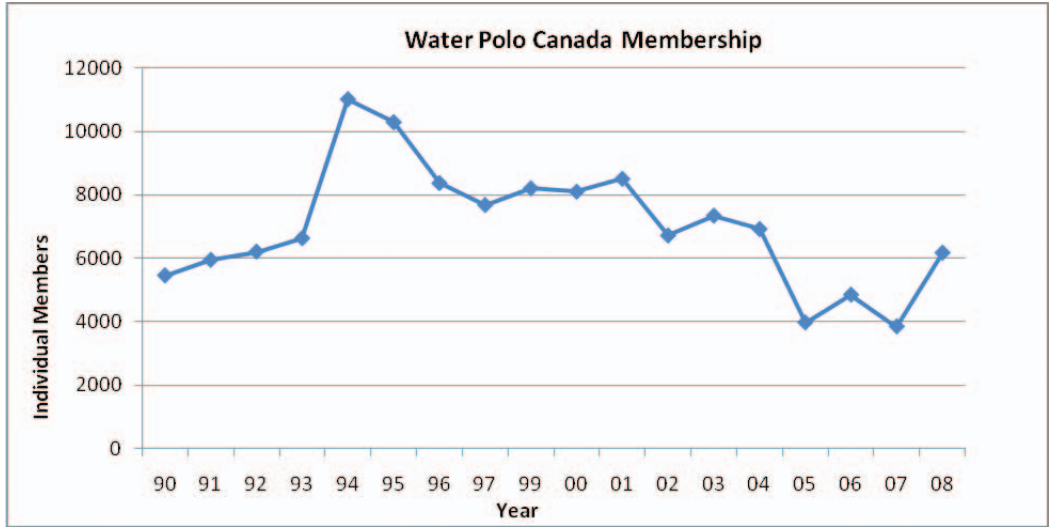
- Lack of membership
- Talent and numbers imbalance
- Centralization
- Competition structure
- Lack of succession planning
- Lack of capacity

Our success as an organization and our ability to attract, develop and retain athletes depends on our ability to address these issues.

Lack of Membership

As indicated in Table 2 below, the number of registered members within Water Polo Canada over the past decade shows a steady decline. This decrease in membership includes athletes, coaches, referees, and volunteers. Please note the table below does not reflect total participants or uninsured members.

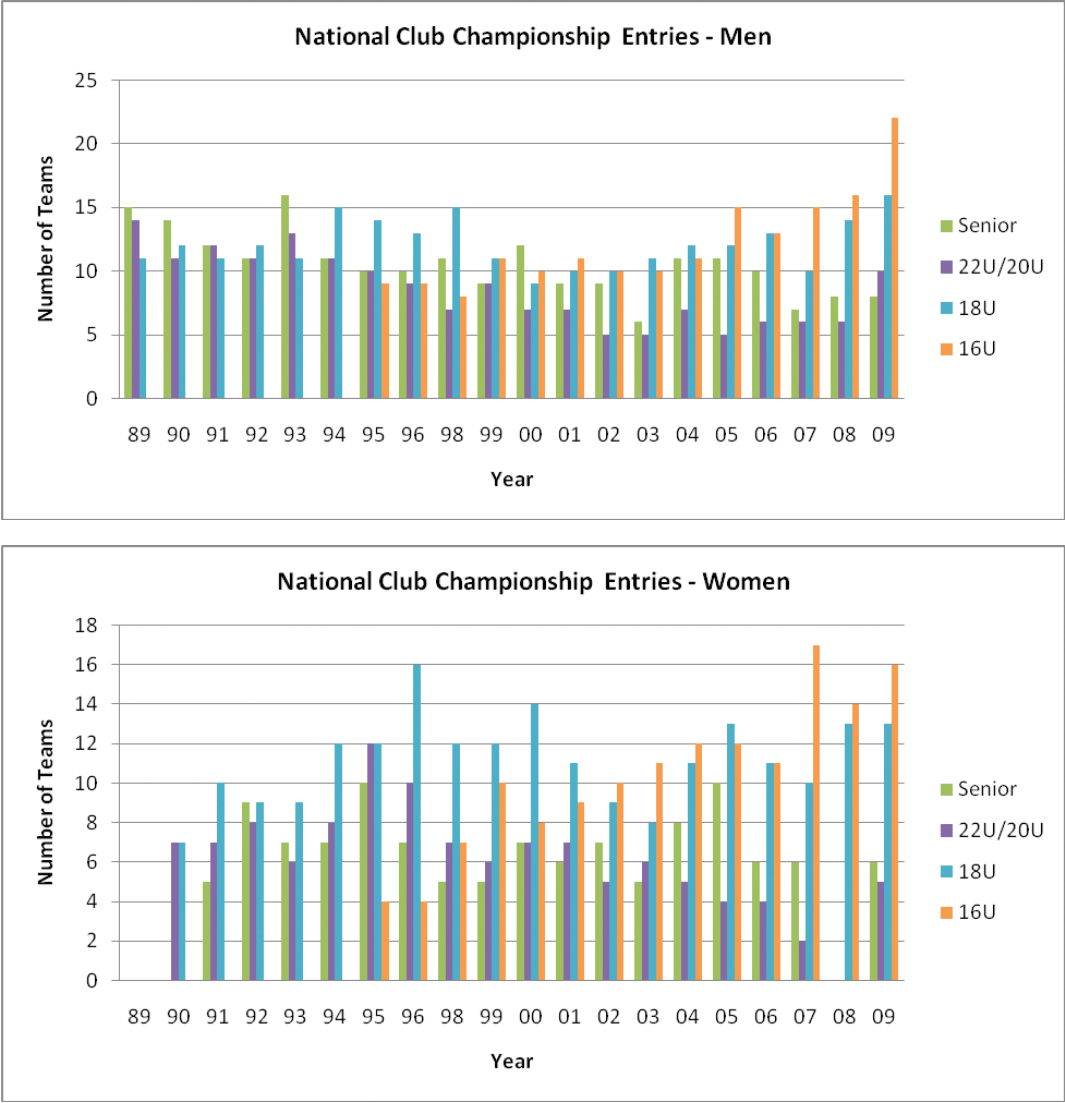
Table 2 - Number of Registered Members – 1990-2008⁶



⁶ Figures provided by Water Polo Canada. Please note that 1996 figures are not available.

Table 3 below illustrates the number of teams entered in the National Club Championships over the past twenty years. During that time, only one age group has experienced growth⁷ – the 16U category (and this group was only introduced in 1996). Over this period, the 18U men and women's age groups have experienced stagnant and declining growth rates respectively, while the 20U/22U⁸ age groups have both experienced a steady decline.

Table 3 - Number of National Club Championship Entries – 1989 to 2008⁹



7 Not reflected in this table is the number of clubs that enter two or more teams (e.g. Calgary A, B, & C).
8 In 2008, the 22 years and under (22U) age category replaced the 20 years and under (20U) age category.
9 Figures provided by Water Polo Canada.

Over this 20 year period, the Senior National Club Championship has experienced predominantly negative growth rates. There was a spike in the number of teams entered in 2004 and 2005 due to the Tier I and II National Club Championships. Aside from those two aberrations, however, this category has seen a downward trajectory.

Geographic concerns play a role in these declines. It is expensive and time consuming for Eastern teams to travel west, and vice versa. As a result, teams from either coast are reluctant to travel long distances to participate in national championships. Illustrating this point further is the fact that the most dominant club at the senior men's level over the past decade failed to enter a team in the 2008 National Club Championship. Even more disturbing is the fact that, in 2007, only two teams registered for the 20U women's championship, and, in 2008, the 22U and Senior Women's competitions were cancelled due to lack of entries. These declines, lack of entries, and cancelled competitions highlight the inefficiency of the current competition structure which does not result in membership growth.

Talent and Numbers Imbalance

There is an imbalance in participation in Water Polo Canada organized events across Canada. Some provinces have strong programs producing a number of teams capable of competing at a national level, while other provinces have struggled to produce competitive teams or even sustain strong participation at the club level. For example, Atlantic Canada used to have a number of successful clubs, but they have recently disappeared from the national scene. In 2007, Nova Scotia renewed its governance as a Provincial Sport Organization (PSO), demonstrating its commitment to the sport. In 2008, New Brunswick did the same thing. However, both provincial programs have experienced difficulties in attracting and developing athletes, which has ultimately impaired their ability to develop strong clubs and teams. In turn, this has led to a lack of involvement in National Club Championships.

Across the country, only Ontario and Quebec have more than three clubs competing at multiple levels, both regionally and nationally. While this seems encouraging, it is important to note that Quebec only has two female clubs training together on a regular basis, showing that even the provinces that have strong participation histories in water polo still have their challenges. In the west, British Columbia, Alberta, Saskatchewan, and Manitoba have three or fewer clubs competing at multiple levels and stages. The 2008 season is the first year in the last decade where the National Club Championships have hosted more than one Vancouver based club team at the 16U men's, 16U women's and 18U men's levels. Only one western club in 2008 had representation at all National Club Championship levels.

This lack of participation across Canada has resulted in a number of problems. As only eight provinces are registered as Provincial Sport Organizations, water polo does not meet the basic criteria for entrance into the Canada Games. In fact, water polo has not been included in the Canada Games since the 1983 Winter Games. Moreover, water polo is the only Canadian sport included in the summer Olympic Games that does not have a national interuniversity presence. The lack of participation in the Canada Games has made it difficult for the sport to grow in this country. Similarly, the lack of a national, interuniversity-level competition for high-performance athletes has made it difficult to retain and develop athletes capable of competing on the international stage.

Despite these challenges, an interesting development has occurred at the national level. Over the past few years, parity has increased between teams. As a result, teams across the country seem to have an equal chance to win National Club Championships, which is very encouraging for the sport. Moreover, it has resulted in balanced representation on international teams. In 2008, this balance was illustrated by the fact that no more than three members of any given club were selected to the 18U (Junior) National Team at the Pan American Games. This stands in stark contrast to earlier teams, where rosters were dominated by members of two or three clubs.

Centralization

Centralization is a Catch-22 for Water Polo Canada. While there is currently a greater parity between clubs across the country, this comes at a time when teams from other nations continue to get stronger. The balance between Canadian teams has not resulted in an advantage in international competitions. Leading international teams benefit from interuniversity competition and professional leagues where top-tier athletes compete against one another regularly, resulting in consistent growth and development. Canada does not have interuniversity or professional leagues. As a result, our athletes and teams are not improving as they could through frequent competition against top level opposition. In Canada, the lack of strong provincial and interprovincial programs leaves our top-tier athletes and teams without the opportunity to strengthen their play by competing against teams at the same level. This makes it difficult to compete against powerhouse European, American, and Australian teams who have become strong through frequent competition against top-ranking opposition.

To develop clubs across the country, National Team athletes need to train at home. High-level athletes training locally will help build local clubs. However, the current club system does not provide adequate training and competitive opportunities for high-performance athletes, which will ultimately stifle their growth and development. Compounding this further, to secure the necessary funding to train at the level required to succeed at international events, teams require a strong international performance. This Catch-22 situation (not getting the funding to succeed internationally until our teams show success at the international level, which will not happen until we have the funds to establish a successful training and development program) puts Canadian water polo at a severe disadvantage internationally.

Centralization creates other problems as well. Centralization results in "burn out" among National Team athletes. Forced to travel great distances to compete against high level teams, these athletes become disheartened by the cost and time involved in competing at this level. In addition, the competition to training ratio is far below

the level required for this stage of athlete development. The current structure does not allow Canadian athletes train through competition (which provides the greatest opportunity for growth and development). The result of this is that these top-tier athletes leave the sport too early. While this clearly undermines international development, it also has an impact on the sport at a national level. When these athletes leave the competitive circuit, they also tend to leave the water polo community. While National Team athletes could remain active as a masters/club athlete, coach, referee, or administrator/volunteer, recent history has shown repeatedly that most retiring athletes elect not to do so. In recent years, most athletes have retired with a bitter taste for the sport due to problems associated with the centralized structure of water polo in Canada, and have no desire to remain involved in the water polo community in any capacity. Water Polo Canada currently offers no post-career support or transition guidance for our top athletes, who end up gravitating away from water polo to the detriment of the sport.

Competition Structure

The current competition structure for water polo in Canada is dysfunctional. This is largely because Water Polo Canada does not consistently offer quality games and training opportunities at low cost and close proximity to participants. Consequently, clubs must travel across the country to find quality opposition. It should not be necessary to travel great distances (at a significant cost to participants) to find competitive opportunities.

Furthermore, the competition structure does not offer tiered (i.e. "AAA", "AA", "A") training and competitive opportunities. Instead, Water Polo Canada offers general high-performance training. This competition structure impacts teams at all levels – the highest level teams do not receive competition that makes them stronger, and teams that are still developing are positioned against better teams that they cannot compete against, which discourages them from further competition.

This structure limits our ability to create a large sustainable base for high-performance development and the growth of the sport in general.

Similarly, our competition pyramid is too narrow, and athletes are being identified for national competition too early in their careers. The current practice of identifying athletes for national and international competitions focuses almost exclusively on early developing athletes at the expense of athletes who mature and develop later. The new Fédération International de Natation (FINA) junior age (18U) will likely reinforce the early talent identification problem.

Finally, there is no coordination between community, regional, scholastic, provincial, national, and international bodies. Tournaments and leagues are operated independently and scheduled ad hoc and do not take into account planning, periodization, and windows of optimal trainability. This lack of alignment is ultimately detrimental to athlete development as competitions are held with no regard for other competitions, taking athletes outside their development programs and stunting their progress.

Succession Planning

Sustained success at the national and international levels requires strong succession planning. Proactive planning is of the utmost importance in order to guarantee an organization will remain functional and successful long after the current managing parties have retired. The loss of programs in various locations and the lack of performance and growth from others reflect poor succession planning and a lack of administrative efficiencies.

Most clubs begin with a former-athlete who is passionate about the sport and wishes to remain involved in some capacity. More often than not, these former athletes hold coaching positions. Fortunate clubs will be led by former National Team athletes, who bring an increased sense of legitimacy to the program because of their prominence and experience.

The administrative structure of most clubs involves a parent of one of the athletes in the club who volunteers their time to run the day-to-day activities of the club. These administrators are elected on a yearly basis.

However, due to the nature of these programs, no focus is placed on the longevity and sustainability of the organization. Coaches and administrators remain active and involved in club life as long as their family members are involved in water polo competition and as long as their lives are conducive to this activity. Frequently, situations change, families grow, and the head coach or club president's life outside the club ends up taking precedence. When this happens, clubs often fold. The majority of Canadian water polo clubs are focused around a micro-managing President and Head Coach. When this coach and/or president leave a club (which happens far too frequently), a vacuum is created. Without a qualified person with the experience and training to assume these vacant roles, the club is not in a position to succeed once the former leadership departs. Since clubs are more reactive than proactive, no time or consideration is given to training future generations to perform the important day-to-day responsibilities of club life. While there are advantages to having very hands-on individuals leading clubs, the nature of these do-it-all operations come at the expense of long-term growth strategies.

Capacity

Currently, all administrative and coaching personnel, Provincial Sport Organizations, Water Polo Canada sub-committees, and clubs work independently and autonomously.

For the sport to grow in Canada, all of these levels must begin working together in a coordinated fashion. All members of the water polo community must find a way to work together and focus on coaching, officiating, and club development for the benefit of the sport. To grow, the number of registered National Coaching Certification Program (NCCP) coaches, trained referees, and volunteers must increase.

Coaches are required to train and develop athletes. Without well-trained and qualified coaches, athletes will not develop at the appropriate levels to become nationally and internationally competitive. Moreover, coaches engender love and respect for the sport in participants. Passionate and qualified coaches pass their love of the

sport onto the athletes, who are more likely to stay involved in and become passionate about the sport. To grow water polo in Canada, we require more qualified coaches to lead more teams.

Referees are needed to officiate games. Without skilled officials overseeing competition, no matches could be held. To increase the number of regular and organized games between clubs, which will ultimately lead to greater competition and increased levels of athlete development, additional numbers of referees are required.

Volunteers are responsible for running the day-to-day activities of clubs. Without volunteers and administrators, clubs could not operate. By increasing the number of volunteers and administrators, clubs will operate better. Increased levels of volunteers will result in better organized leagues and tournaments. A strong complement of volunteers will also allow coaches to focus on coaching, recruiting, and implementing long-term athlete development plans that work for their clubs and regions.

While one of the ultimate goals of the Long-Term Athlete Development program is stronger performance in international competition, for the sport to grow in Canada, our focus cannot be on the high-performance (excellence) stream alone. To grow the sport across the country, we must concentrate on developing community and regional networks. By focusing on club development, we will build a stronger base of athletes, clubs and teams that will eventually produce better athletes capable of competing at the national and international levels. To ensure the success of these efforts, we must educate all athletes, parents and individuals in the community that opportunities exist for them to be involved in the sport at all levels – coaching, officiating, volunteering – not just as National Team athletes.

To grow water polo in Canada, we must address these six key issues. Small membership numbers reflect the overall health of the sport in Canada and directly impact our ability to develop world-class athletes capable of competing on the international stage. The growing imbalance between provinces with strong water polo programs and struggling provinces that do not have a strong local or national presence does not just impact the struggling provinces. With reduced opportunity for competition, the strong programs do not develop as much as they could, and the development of national and international level teams and athletes suffers. The lack of interuniversity and professional leagues in Canada means that our top-tier athletes are not being pushed through regular competition, which results in a lack of experience and ability to compete against international teams who benefit from strong national competition programs. The structure of most clubs is prohibitive to future success, as a lack of proactive succession planning negatively affects the long-term health and vitality of the club. The current shortage of trained coaches, officials and skilled volunteers will ultimately limit the growth of the sport across the country, as without qualified people to run the clubs and competitions, our athletes will have nowhere to play.

The Long-Term Athlete Development pathway model provides a framework to address all of these concerns. The dual focus of Long-Term Athlete Development – developing athletes for life and producing top-tier athletes ready to succeed in international competition – provides the structure to grow the sport through athlete recruitment, development, and retention. The Long-Term Athlete Development model has been adopted in other countries for a variety of sports, and has produced positive results. To address the various challenges currently facing water polo in Canada and to ultimately succeed on the national and international stage, we must adopt the Long-Term Athlete Development model.

Sensitive Periods of Trainability



The Long-Term Athlete Development pathway model teaches that sustained success comes from training and performing well over the long-term rather than winning in the short-term. To achieve this success, a well-planned practice, training, competition, and recovery regime is invaluable in ensuring optimum development throughout an athlete's career¹⁰. It is therefore imperative that coaches understand the physical, mental and cognitive, and emotional development of their athletes to prepare the appropriate periodization model.

The Long-Term Athlete Development model identifies periods of optimal trainability throughout the life of an athlete. If these windows of opportunity are not fully realized, athletes may not reach their full genetic potential, even with scientifically designed remedial programs. Coaches must be aware of these sensitive periods of accelerated adaptation to ensure that these windows of opportunity are fully exploited and athletes have every opportunity to develop to their full potential. Moreover, it is important that coaches and club and league administrators understand that these periods are measured by developmental age, not chronological age, and that developmental age differs among genders. As a result, combining male and female competition and training programs is not advised beyond the age of 10, as female athletes mature earlier than their male counterparts.

¹⁰ Balyi I., Cardinal C., Higgs C., Norris S., and Way R. Long-Term Athlete Development - Canadian Sport for Life, 2005.

The following terms help explain the physiological and mental development process and trainability of an athlete:

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

Maturation refers to qualitative system changes, both structural and functional, in the body's progress toward maturity such as the change of cartilage to bone in the skeleton.

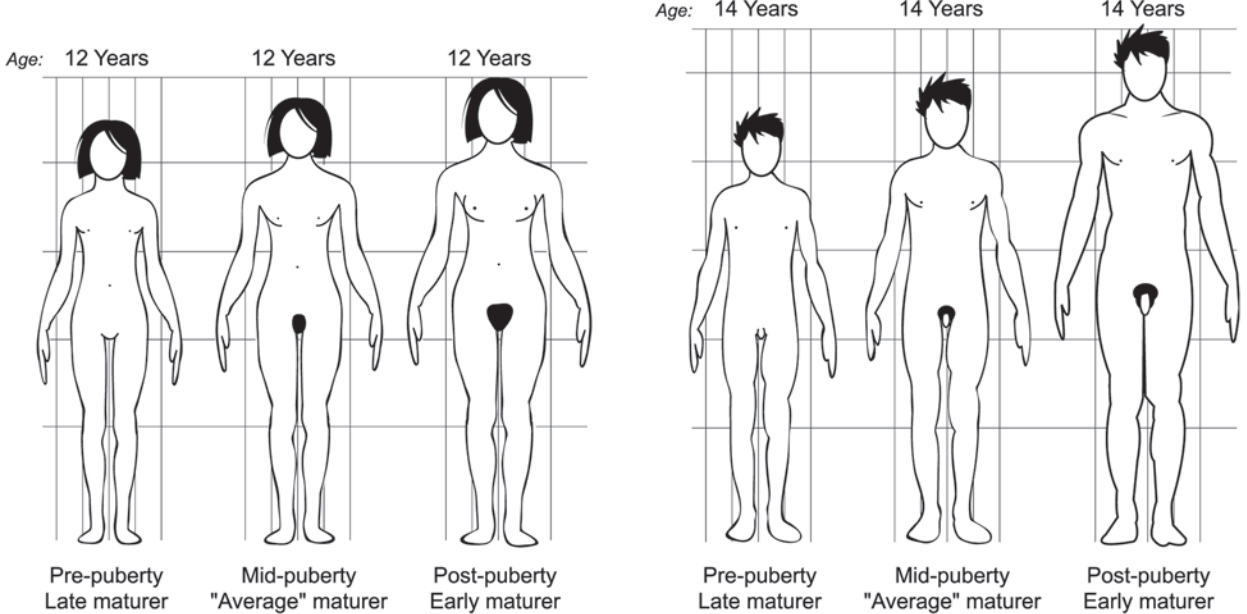
Development refers to the interrelationship between growth and maturation in relation to the passage of time. The concept of development also includes the social, emotional, intellectual, and motor realms of the child.

Chronological age refers to the number of years and days elapsed since birth. Children of the same chronological age can differ by several years in their level of biological maturation.

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

Peak Height Velocity (PHV) is the maximum rate of increase in growth of stature during growth spurt. The age of maximum velocity of growth (i.e. the period where an individual's growth is most accelerated) is called the age at PHV.

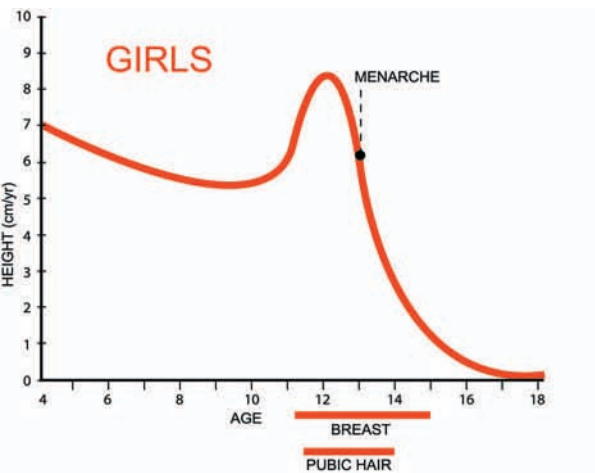
Figure 1 - Maturation in Females and Males¹¹



Long-Term Athlete Development requires the identification of early, average, and late maturers in order to help design appropriate training and competition programs in relation to optimal trainability and readiness. The beginning of the growth spurt and the peak of the growth spurt are very significant in training and competition design.

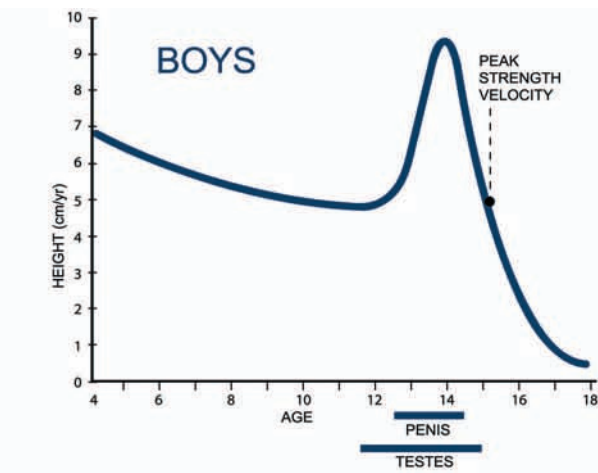
11 Adapted from Tanner, J.M. "Growing Up" Scientific American, 1973, and Balyi I., Cardinal C., Higgs C., Norris S., and Way R. Long-Term Athlete Development - Canadian Sport for Life, 2005.

Figure 2 - Maturity Events in Females¹²



12 Ross, W.D. and Marfell-Jones, M.J. "Kinanthropometry" Physiological Testing of the Elite Athlete, Eds. MacDougall, J.D., Wenger, H.A., and Green, H.J., 1982.

Figure 3 - Maturity Events in Males¹³



13 Ross, W.D. and Marfell-Jones, M.J. "Kinanthropometry" Physiological Testing of the Elite Athlete, Eds. MacDougall, J.D., Wenger, H.A., and Green, H.J., 1982.

As demonstrated in Table 2, Peak Height Velocity in females occurs at approximately 12 years of age. The first physical sign of adolescence is usually breast budding, which occurs slightly after the onset of the growth spurt. Shortly thereafter, pubic hair begins to grow. Menarche, or the onset of menstruation, comes rather late in the growth spurt, occurring after PHV is achieved. The sequence of developmental events may occur two or more years earlier or later than average.

Peak Height Velocity in males is more intense than in females and on average occurs about two years later. Growth of the testes, pubic hair, and penis are related to the maturation process. Peak Strength Velocity (PSV) follows approximately one year after PHV. As a result, there is pronounced late gain in strength characteristics for male athletes. As with female athletes, the developmental sequence for male athletes may occur two or more years earlier or later than average, meaning that early maturing males may have as much as a 4-year physiological advantage over their late maturing peers. These late maturers will eventually catch up when they experience their growth spurt.

In water polo and many other Canadian sports, current training and competition programs are based on chronological age. However, as the tables above indicate, athletes of the same chronological age between the ages 10 and 16 can be four to five years apart in their development.

In order to combat the chronological/physiological age dilemma, the Long-Term Athlete Development pathway model suggests that early maturing athletes play up at older levels. Early maturers and above average athletes should not train and compete within their own age groups as this may hinder their athletic development and discourage the late maturers (who cannot compete physically with individuals who have developed early). Due to their size and strength advantage, early maturers have the potential to develop bad habits by training and competing with peers of the same age. When the developmental age of the late maturers catches up their chronological age, they will be more technically advanced than their early maturing peers who dominated the sport at an early age due to their size advantage.

Training age refers to the age where athletes begin participating in regular, planned, and goal-oriented training. An athlete's training is influenced by the his or her developmental status – individuals who mature at an early age have a major advantage over average or late maturers during the Competitive Foundations stage. However, after all athletes have gone through their growth spurt, late maturers often exhibit greater potential to become top athletes provided they experience quality coaching throughout their development.

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.

Trainability refers to the faster adaptation to stimuli and the genetic endowment of athletes as they respond to specific stimuli and adapt to it accordingly. Trainability refers to the responsiveness of developing individuals to training stimulus at different stages of growth and maturation.

Sensitive period of development refers to points in the development of specific capacities when training has an optimal effect. Factors such as readiness and critical periods of trainability during growth and development of young athletes, where the stimulus must be timed to achieve optimum adaptation with regard to motor skills, muscular, and/or aerobic power, also influence these sensitive periods of development.

Windows of optimal trainability refers to the sensitive periods of accelerating adaptation to training, which occurs prior to, during, and early post-puberty. During sensitive periods, the window for optimal training is fully open. This window remains open outside the sensitive periods, ensuring that there is always an opportunity for training and development.

Ancillary capacities refers to additional factors that influence an athlete's training and performance capabilities. These factors include warm-up and cool down procedures, stretching, nutrition, hydration, rest, recovery, restoration, regeneration, mental preparation, and taper and peak. The more athletes and coaches are aware of these variables, the more they can incorporate these elements into their lives to enhance training and performance levels. Even when athletes reach their genetic potential and are no longer capable of physiological improvement, their performance can be augmented by incorporating ancillary capacities.

Figure 4 – Variation in Trainability¹⁴

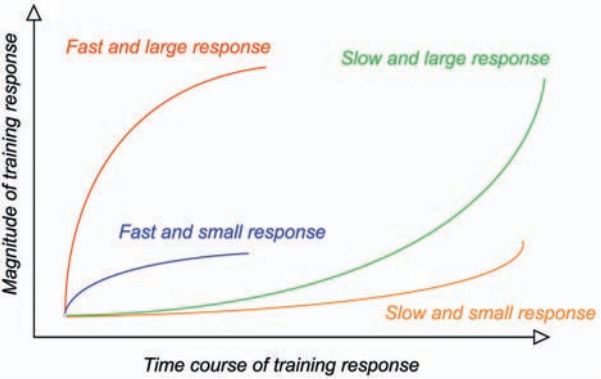


Figure 4 above illustrates the high degree of variation in the trainability of athletes, both from the standpoint of the magnitude of change and the time course of response to a given stimulus. This probably reflects the elasticity of response to various stimuli and human diversity (as largely dictated by the underlying genetic matrix and supported by the environment in which an individual is immersed)¹⁵.

The 5 Basic Ss of Training and Performance are Stamina (Endurance), Strength, Speed, Skill, and Suppleness (Flexibility).¹⁶

¹⁴ Adapted from work by Bouchard et al., 1997.
¹⁵ Norris, S.R., Smith, D.J. "Planning, Periodization, And Sequencing of Training And Competition: The Rationale For A Competently Planned, Optimally Executed Training And Competition Program, Supported By A Multidisciplinary Team." M. Kellmann (Ed.) Enhancing Recovery: Preventing Underperformance in Athletes, 2002, pp.121-141.
¹⁶ Dick, F.W., Sports Training Principles, 1985.

Stamina (Endurance)

The optimal window of endurance trainability occurs at the onset of Peak Height Velocity. Aerobic capacity training is recommended before athletes reach Peak Height Velocity. Aerobic power should be introduced progressively after growth rate decelerates.

Strength

The optimal window of strength trainability for females is immediately after Peak Height Velocity or at the onset of the menarche. For males, the optimal window of trainability is 12 to 18 months after Peak Height Velocity is reached.

Speed

For males, the first speed training window occurs between the ages of 7 and 9 years and the second window occurs between the ages of 13 and 16. For females, the first speed training window occurs between the ages of 6 and 8 years and the second window occurs between the ages of 11 and 13 years.

Skill

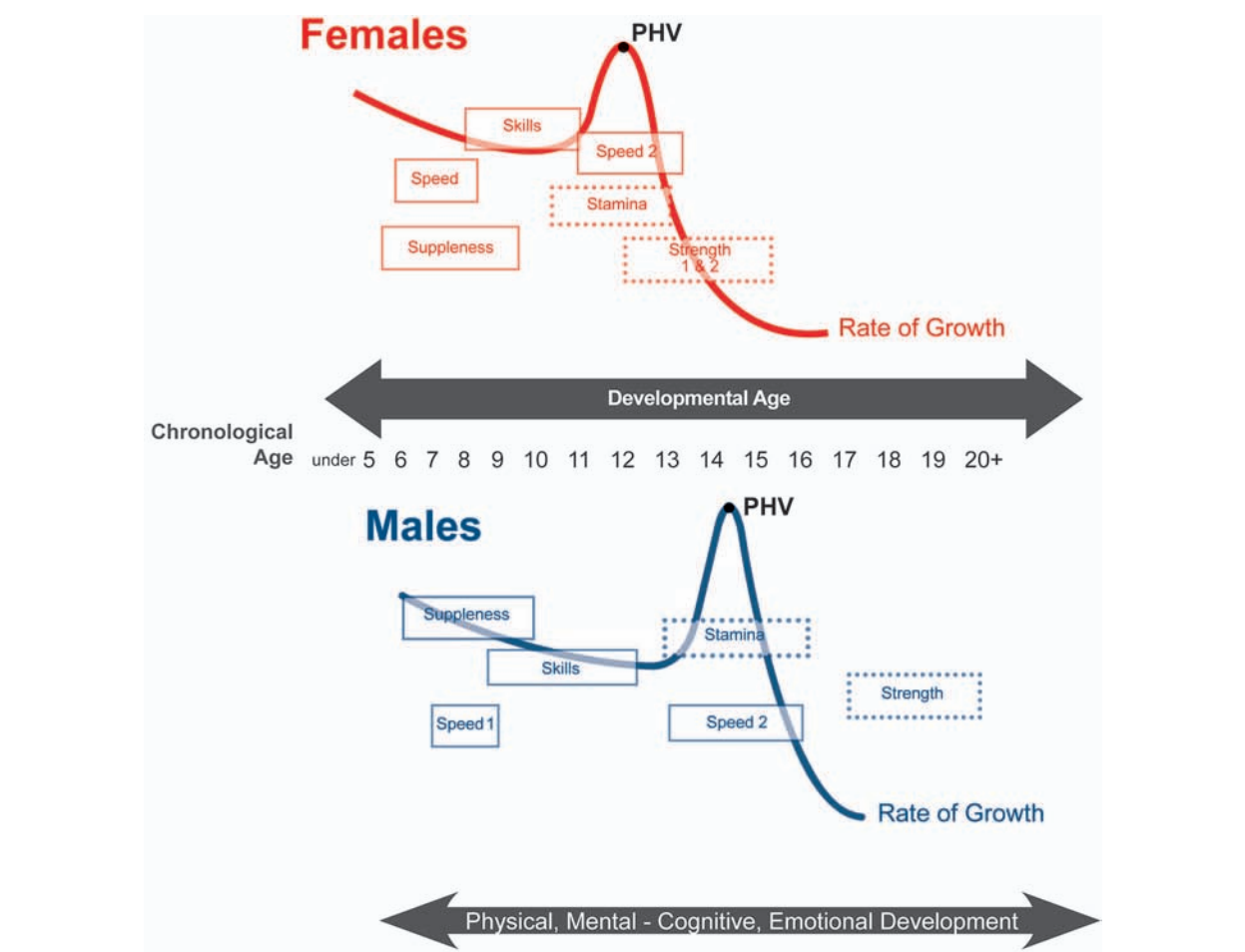
The window for optimal skill training for males takes place between the ages of 9 and 12 and between the ages of 8 and 11 for females.

Suppleness (Flexibility)

The optimal window of trainability for suppleness for both genders occurs between the ages of 6 and 10.

Figure 5 illustrates the Windows of Optimal Trainability for Females and Males. Two windows – stamina and strength – are based on the moving scales of the onset of the growth spurt and Peak Height Velocity. The other three windows – speed, skill, and suppleness – are based on chronological age.

Figure 5 – Windows of Optimal Trainability¹⁷



As illustrated above, the windows of optimal training for suppleness, speed, and skill development are chronological – under the age of 12 for females and under the age of 13 for males. The windows of optimal training for stamina and strength, on the other hand, are dependant upon developmental age – the onset of Peak Height Velocity (indicated above by the dotted-line boxes). After approximately 10 years of age, both the physical and biological maturation of the individual athlete needs to be considered, as the windows of optimal trainability differ greatly between males and females. As a result, mixed gender training and competition for athletes after the age of 10 is counter-productive and should be avoided.

Appendix 1 details the basic characteristics, general impact, and implications about an athlete's physical, mental, cognitive, and emotional development for late childhood, early puberty, late puberty, and early adulthood. Coaches must be familiar with, understand, and be able to apply all aspects described in Appendix 1 to help ensure athletes reach their maximum potential.

¹⁷ Balyi I., Cardinal C., Higgs C., Norris S., and Way R. Long-Term Athlete Development - Canadian Sport for Life, 2005 .

Periodization

The concept of periodization centres on time management – it is the process of varying a training program at regular time intervals to produce peak performance for a specific competitive event. The basic principle of periodization in workout routines is a shift from an emphasis on high volume (Exercises x Sets x Repetitions) and low intensity (% of maximum effort) training to low volume and high intensity training. In the context of Long-Term Athlete Development, periodization connects the stage the athlete is in to the requirements of that stage.

As a tool, periodization is highly flexible. When used in conjunction with sound methodology and ongoing monitoring and evaluation, it is an essential component in optimal sports programming and athlete development. Although the concept of periodization is drawn from scientific research, active coaching is heavily involved in creating the appropriate periodization plan.

In periodization, the training year (or macrocycle) is divided into distinct phases. Each phase contains a number of smaller components (or mesocycles) relating to a change in the volume and intensity of training. A mesocycle may last up to one month. Typically, each mesocycle reflects a specific training emphasis for that phase of training. Within each mesocycle are several smaller cycles (or microcycles) that are usually seven days in length. The number of recovery microcycles determines the length of the mesocycle. For example, a 4-week mesocycle would entail three weeks of increasing intensity with one week of lower intensity (creating a loading to recovery ratio of 3:1). If a macrocycle phase lasts more than the 4-week loading-recovery period, then a combination of loading/recovery periods within that phase (e.g. 2 x 3:1 = 8 week period) may be created.

Table 4 – Phases of an Annual Plan – Single and Double Periodization¹⁸

Five Phases of A Single Periodized Annual Plan	Eight Phases of A Double Periodized Annual Plan
General Preparation Phase (GPP)	General Preparation Phase (GPP)
Specific Preparation Phase (SPP)	Specific Preparation Phase 1 (SPP1)
Pre-Competition Phase (PCP)	Pre-Competition Phase 1 (PCP1)
Competition Phase (CP)	Competition Phase 1 (CP1) Peak 1
Transition Phase (TP)	Specific Preparation Phase 2 (SPP2)
	Pre-Competition Phase 2 (PCP2)
	Competition Phase 2 (CP2) Peak 2
	Transition Phase (TP)

Table 4 describes generic phases within a given yearly training plan. The single period model is useful when there is only one peak within the macrocycle (i.e. the year is spent building towards a single goal, such as a competition), whereas the double or triple period models are used when there are two or three peaks (i.e. two or three goals or competitions). Please note that there must be a few months between peak periods for double or triple periodization to be successful. Moreover, it is possible to have multiple peaks occurring during the competition phase of the yearly planning cycle; however, intensity must remain at a high level for the athletes to reach an extended peak. Appendix 2 provides examples of single, double, and triple periodization cycles.

18 Adopted from Balyi I., Cardinal C., Higgs C., Norris S., and Way R. Long-Term Athlete Development - Canadian Sport for Life, 2005.

Table 5 below describes the five phases of periodization as applied to water polo athlete development, and identifies the objectives of each phase.

Table 5 – Objectives of Periodization Phases¹⁹

Technical Development (General Preparation Phase)	<ul style="list-style-type: none">•Build aerobic base by slowly shocking body with eustress (positive physical stimuli).•High volume, low intensity training.•Rather than swimming lengths or running laps, aerobic base is built through the development of basic water polo skills.
Conditioning (Specific Preparation Phase)	<ul style="list-style-type: none">•Continue to build aerobic base while increasing the intensity of the swim sets and water polo drills.•Maintain the basic skills, while moving onto more advanced skills and some position specific skills.
Pre-Competition Phase	<ul style="list-style-type: none">•Transition to high intensity, moderate volume training.•Focus on developing strength and recovery.•Maintain basic skills, perfect advanced skills, and focus on position and situational specific skills.
Competition Phase (Peak)	<ul style="list-style-type: none">•High intensity, low volume training to build speed.•Technical focus is dedicated towards perfecting strategic system.•Requires ample recovery time within drills – a 6:1 work to recovery ratio.•Active recovery²⁰ is key to development.
Post-Season (Transition Phase)	<ul style="list-style-type: none">•Provide athletes opportunity to recover from the mental and emotional stress of competition.•A minimum of two weeks out of the water.•Focus on maintaining entire skill set built over the season. Keep workouts fun and motivational.•Continue building aerobic base.

19 Adopted from Balyi I., Cardinal C., Higgs C., Norris S., and Way R. Long-Term Athlete Development - Canadian Sport for Life, 2005.

20 An example of active recovery is, after having performed a high intensity task, resting with the use of a low intensity task.

Physical Literacy

Childhood obesity and rising inactivity among children are problems that need to be addressed now to prevent a generation of children from growing up with chronic health problems. Physical activity later in life depends on feeling confident in an activity setting; confidence as an adult often comes from having learned fundamental movement and sport skills as a child.

Physical literacy is the development of fundamental movement skills and fundamental sport skills that permit a child to move confidently and with control in a wide range of physical activity, rhythmic (i.e. dance), and sport situations. Physical literacy also includes the ability of individuals to "read" what is going on around them in an activity setting and react appropriately to those events. This developmental stage takes place between the ages of 0 and 12.

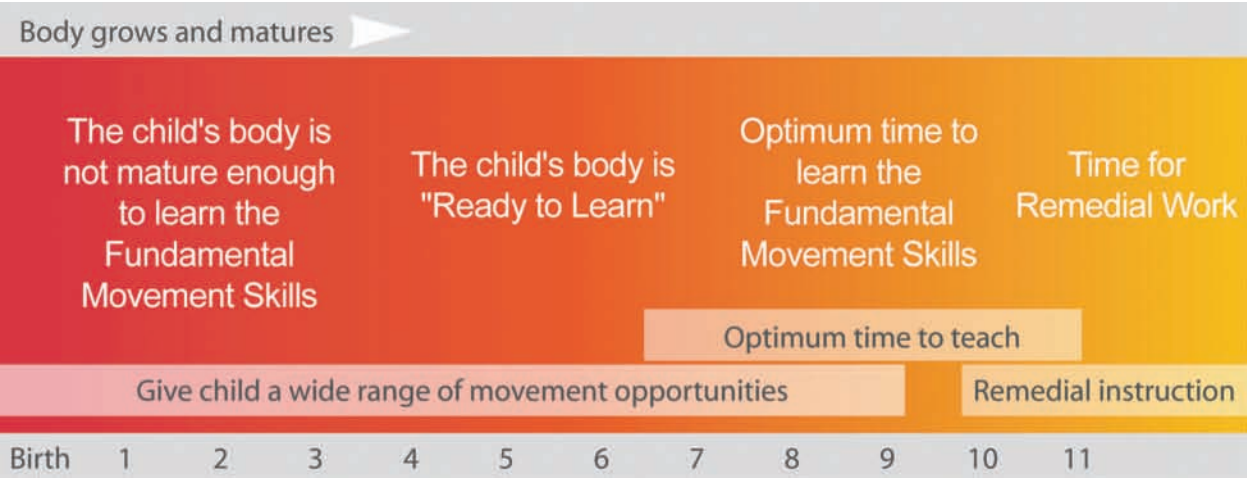
Table 6 – Who is Responsible for Physical Literacy²¹

LTAD Stage	Where?	Physical Literacy	Who?
	Schools Sport clubs Community recreation Sport programs Home	Learn to Train Girls 8-11, Boys 9-12	Parents/Guardians Coaches Teachers Recreation leaders Youth leaders
	Schools Sport clubs Community recreation Sport programs Home	FUNDamental Girls 6-8, Boys 6-9	Parents/Guardians Coaches Teachers Recreation leaders Youth leaders
	Home Pre-schools Day care Sport programs Community recreation	Active Start Girls and Boys 0-6	Parents/Guardians Day care providers Pre-school teachers Kindergarten teachers

21 Adopted from Developing Physical Literacy, a supplement of Canadian Sport for Life.

As a child grows and develops/matures, nerve cells make more connections. At the same time, the muscles of the body get stronger. For a skill to be developed, both the body and the mind must be ready. If the brain is not mature enough, or the muscles are not strong enough, the child simply cannot learn the skill. Trying to teach the child when the body is unable to learn the skill will accomplish little. During the physical literacy stage, it is important to provide the child with as many opportunities as possible to explore all possible movements in a rich environment that is both safe and challenging. As skills begin to emerge naturally, learning can be dramatically improved through opportunities for fun practice using a variety of equipment and materials. Providing the child with simple instruction and plenty of practice can help the child develop confidence that stays with them for life (though, admittedly, this may not accelerate the learning process). Table 7 below shows a progression of when the child's body and mind are mature enough to begin learning the fundamental movement and sport skills.

Table 7 – Learning Fundamental Movement Skills²²

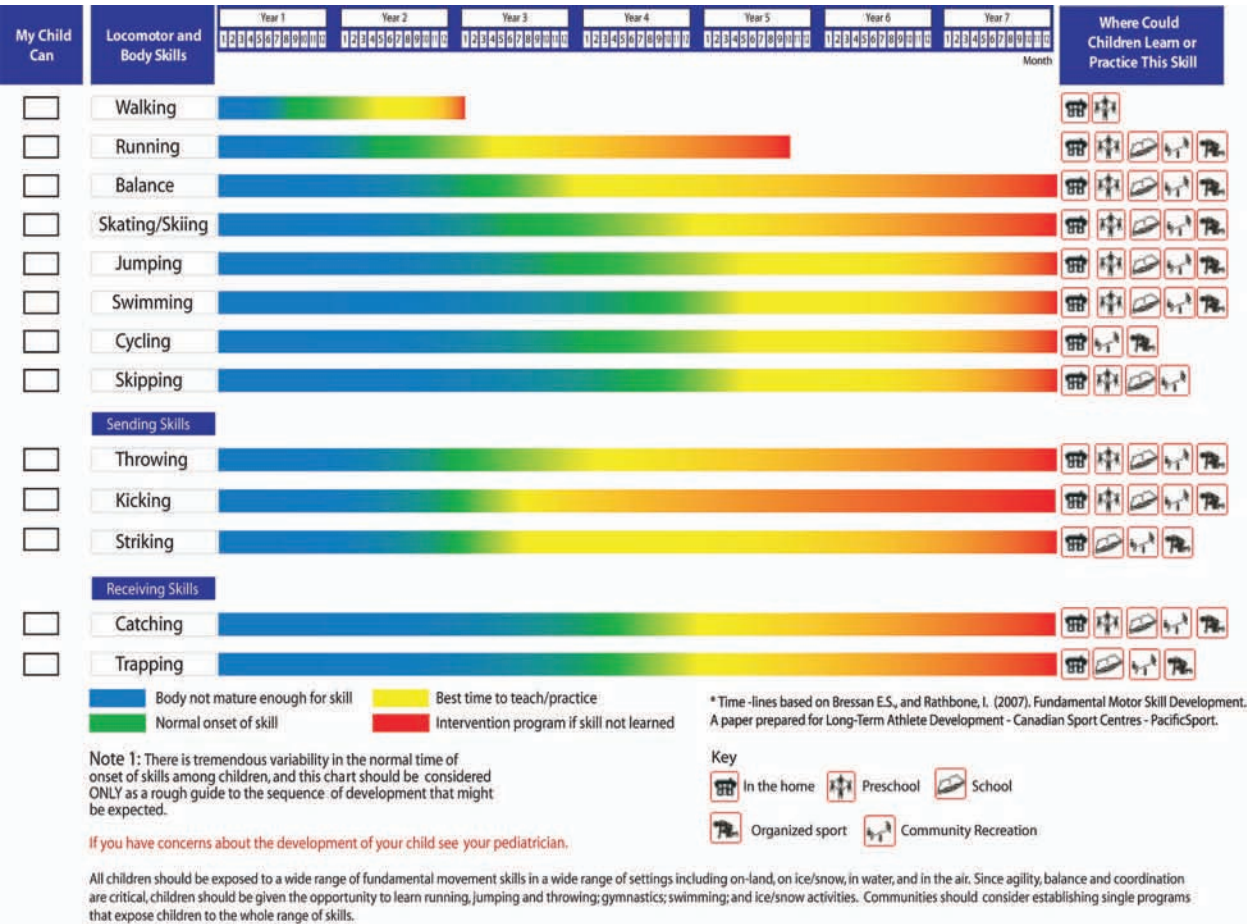


For every emerging skill there is an ideal or best time for the child to learn. While the best time to teach a particular skill to an individual child varies, there is great consistency in the sequence children learn skills. If the child goes too long without learning a specific skill, then learning it may become more difficult. However, the sooner the child starts to overcome the learning deficit, the easier it is for them to catch up and develop the skill and confidence needed to be fully active with their peers.

Many skills need to be learned, and there is no single place a parent can take their child to learn them all. To help understand the sequence of development of children, the Fundamental Movement Skills chart is provided below as Table 8. This chart outlines the important physical skills each child needs to master, identifies when a child is ready to learn each skill, pinpoints the optimum time to learn the skill, and notes where the child can learn or practice each skill. It also identifies the age by which failure to learn the skill might motivate care-givers to seek professional help.

22 Adopted from Developing Physical Literacy, a supplement of Canadian Sport for Life.

Table 8 – When and Where Children Learn and Practice Fundamental Movement Skills²³



For children to have success in sport, either as a health related recreational activity or in competition, they must master fundamental movement skills before learning fundamental sport skills. In turn, fundamental sport skills must be learned prior to being introduced to sport specific techniques. Given the nature of water polo, it is understandable that most athletes will not join the sport until late in the Physical Literacy stage or after. However, it is important that communities are aware of the significance of the development of fundamental movement skills, so that when children join sports (including water polo) they continue their skills development by progressing to

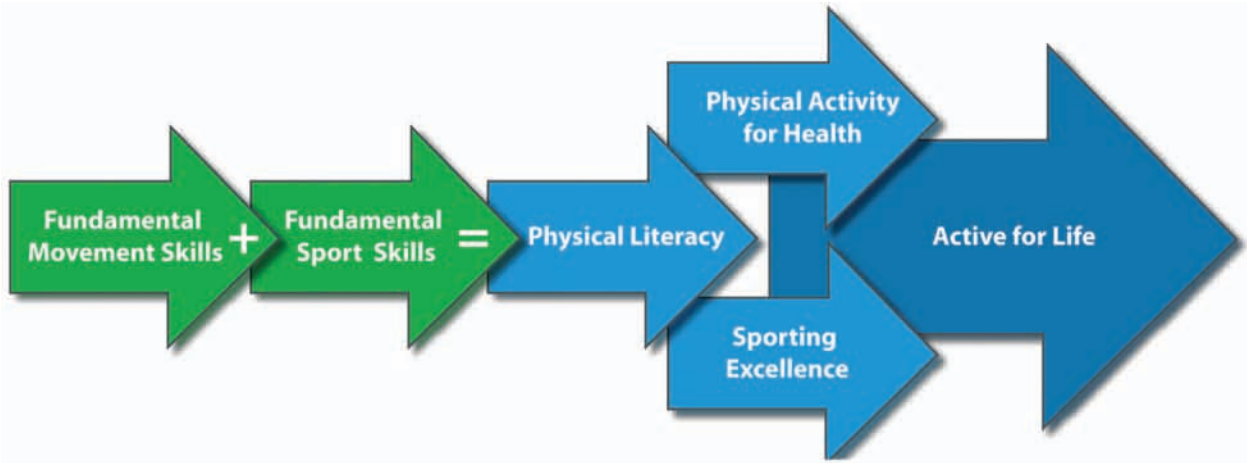
fundamental sport skills. When children join water polo at the FUNdamentals phase of the I Love Water Polo program, emphasis should be placed on continued development of the fundamental movement skills, rather than solely teaching water polo. The fundamental movement skills of balance, swimming, catching, and throwing are needed to participate or compete in water polo. Without a sound skill base in these areas, water polo coaches at the Technical Foundations and Competitive Foundations pathways will be forced to focus on fundamental movement skills rather than teaching fundamental water polo skills and/or specific water polo techniques.

²³ Adopted from Developing Physical Literacy, a supplement of Canadian Sport for Life.

When a child has confidence in his or her ability to take part in recreational and sporting activities without fear of failure, the probability that they will join in is high. Moreover, if they enjoy the activity they will likely continue with it. A child's movement confidence develops gradually as they grow and learn, and children constantly compare their own level of ability with the ability of the children they play with. Physically literate children who move with skillful

purpose know that they move well, and this confidence encourages them to try new and different activities without fear. Having a well developed set of physical literacy skills is key for success in any athletic activity. As a result, it is important that communities embrace the development of these fundamental movement skills. Success in basic development leads to active living and participation in sports. It also is a key factor in athlete retention.

Figure 6 – Physical Literacy Leads to an Active Life²⁴



²⁴ Adopted from Developing Physical Literacy, a supplement of Canadian Sport for Life.

Stages of Long-Term Athlete Development

The Long-Term Athlete Development model combines scientific research about physical and mental development, skills acquisition, and training methodology with the art of coaching. Understanding how bodies work, develop, and respond to stimuli is critical in developing successful athletes. Ensuring that this scientific knowledge is employed by coaches to engage, motivate, and teach athletes to play the sport is just as important. This section will describe the various stages of development that comprise the Long-Term Athlete Development pathway model for Water Polo Canada.

There are three goals for the Long-Term Athlete Development program for water polo:

1. Expanding the sport to include more athletes at earlier ages/stages of development
2. Ensuring that athletes are active for life
3. Creating and maintaining a sustainable high-performance program

Figure 7 – Tiered Competition Diagram²⁵

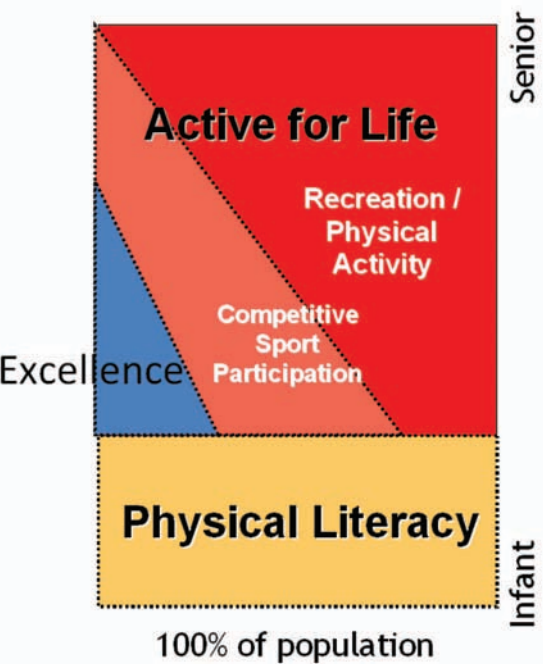
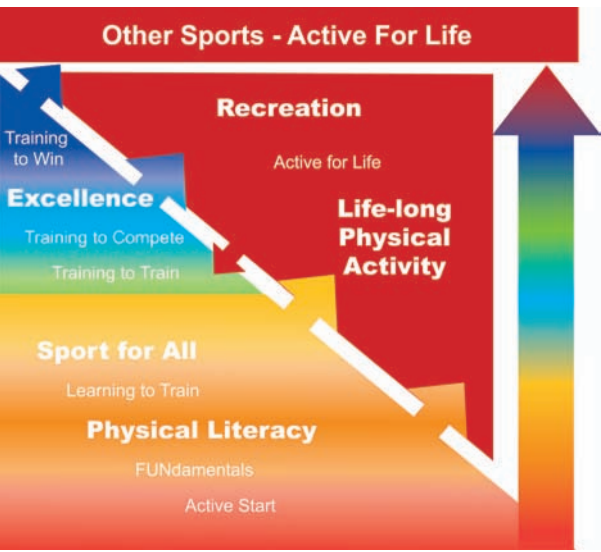


Figure 7 uses colours to depict the different levels in the Water Polo Long-Term Athlete Development pathway. The largest section, Active for Life, appears in red and represents recreational or community training and competition. The orange section, Competitive, represents the current level of training and competition offered by Canadian clubs. The blue section, Excellence, represents the high-performance group of athletes. Providing the foundation for each of these sections is Physical Literacy, which is indicated in yellow. The trajectory of this diagram – from cradle (at the bottom) to grave (at the top) – depicts how people progress through sports. Underlying any kind of sporting activity is the development of the skills (both basic movement and sport related) that are required to participate in sports. Upon acquisition of these skills, participants fall into excellence, competitive, and recreational divisions. Over time, both the excellence stream and the competitive stream narrow (the excellence stream, in fact, ends), while the recreational stream expands, revealing how fewer people remain involved in the high performance and competitive streams as they age, and how most people move into recreational physical activity.

Building upon the tiered competition system noted in Figure 7, Figure 8 below outlines how each stage of Long-Term Athlete Development and the streams of water polo competition link with other sports. All sports and recreation activities require the development of fundamental movement and fundamental sport skills, which is collectively known as Physical Literacy. Take note how the colours used in Figure 7 translate and merge with the pathways in Figure 8 (red represents recreational/life-long sport, orange represents competitive sport, and blue represents excellence in sport).

²⁵ Balyi I., Cardinal C., Higgs C., Norris S., and Way R. Long-Term Athlete Development - Canadian Sport for Life, 2005.

Figure 8 – Participation in Life-long Physical Activity²⁶



In Figure 8, the multi-colored triangle to the left begins with Active Start and progresses upwards to Training to Win, representing the Canadian Sport for Life Long-Term Athlete Development model. Fundamental movement skills and fundamental sport skills (Physical Literacy) provide the foundation for training and excellence that follow as an athlete develops and progresses.

The red triangle to the right represents activity/participation in other sports. Many of the athletic abilities transfer between the water polo model and participation in other sports, as foundation skills and training principles are common to both areas. Over time, the wide base of athletes that make up the bottom of the pyramid narrows through the competition stream, while the number of athletes involved in recreational/activity sport grows as people move out of the competitive stream and into the recreational stream.

Active for Life is both a competition stream (represented by the red section in Figure 7) and a Long-Term Athlete

²⁶ Balyi I., Cardinal C., Higgs C., Norris S., and Way R. Long-Term Athlete Development - Canadian Sport for Life, 2005.

Development pathway (illustrated by the red triangle in Figure 8). After the Physical Literacy stage, participants can freely move in and out of all levels of competitiveness (Active for Life, Competitive, and Excellence) up until the Training to Compete, Training to Perform²⁷ and Living to Win stages. While the general trajectory for most athletes is to move from the Competitive or Excellence streams to the Active for Life stream, it is also possible (though difficult) for participants to move from the Active for Life stream at the Training to Compete stage to the Competitive or Excellence streams. Participants are able to choose their own path at the Competitive Foundations (Training to Train) stage, as indicated by the directional arrows in Figure 8. It is important to note that the Active for Life pathway does not promote community and recreational water polo opportunities exclusively. Instead, the Active for Life pathway also provides former athletes with opportunities to become involved as coaches, referees, and administrators/volunteers.

An athlete who is multi-sport oriented may follow the Active for Life pathway and competition stream for more than one sport during the Competitive Foundations (Training to Train) stage. However, this physically active person can decide to pursue a water polo career and move into the Competition and Excellence stream. Active for Life and Physical Literacy illustrate how Long-Term Athlete Development links water polo with all other systems (e.g. community, education) and all other sports.

The Water Polo Canada Long-Term Athlete Development summary framework matrix is included in Appendix 3. This framework flushes out the concepts illustrated in Figure 8. Understanding the color schemes, levels of competitiveness, and links with other sport and physical activity systems is important when using the matrix.

Water polo is a late specialization sport. In this respect, water polo is quite unique within Canadian sport. Most

²⁷ The Training to Win stage has been separated into Training to Perform and Living to Win as water polo athletes are late maturers. However, an emphasis on winning needs to occur at the Junior National Team and National University Team (Fédération Internationale de Sport Universitaire) levels prior to athletes joining the Senior National Team.

sports (e.g. hockey, soccer, baseball, etc.) encourage participation from a very young age. For example, participants do not require a highly developed set of skills before playing organized soccer, so children can join leagues and begin playing at age 4. Water polo, on the other hand, requires demonstrated proficiency in a number of important skills (i.e. swimming), which necessitates late entry into the sport. Moreover, because individuals come to the sport later, and because they require skills and abilities that cannot be taught until certain levels of physical and mental maturity are reached, participants are unable to specialize in water polo until much later in their athletic development.

As a result of this unique status, the following Long-Term Athlete Development pathways have been created for all water polo coaches, athletes, parents, and administrators/volunteers to follow. These pathways provide a framework for expanding water polo programs, assessing athlete development and skill levels, developing high-performance athletes and teams for national and international competition, and advancing a culture of participation for life.

Currently, water polo programs in Canada tend to focus on chronological age rather than developmental age. Under this model, too much emphasis is placed on early maturers and athletes born in the first quarter of the year, as they tend to dominate competition at younger ages. Those athletes with birthdays later in the year or lack of size at an early age are often looked over as potential high-performance athletes.

Moving forward, all athlete assessment must follow the Long-Term Athlete Development model, which emphasizes developmental age rather than chronological age. That is, the Long-Term Athlete Development model recognizes that athletes develop at different rates, and that those individuals who bloom later still have the ability to be high-performance athletes even though they might not excel at an earlier age. Prior to assessing an athlete's potential, the developmental age and the stage of growth

must be considered. Peak Height Velocity (PHV) and the onset of PHV are extremely important in evaluating the future abilities of an athlete. Late maturing athletes must be made aware of the reasons why they are developing differently than their peers. Conversely, early maturing athletes must understand that teammates and opponents will catch up to them after they have experienced their own growth spurts. Both early and late maturing athletes may get discouraged because of the developmental age imbalance. The Long-Term Athlete Development pathway provides the framework to overcome this obstacle and give equal training and development opportunities to all.

The structure of the Long-Term Athlete Development model for Water Polo Canada is:

- 1. Active Start
- 2. I Love Water Polo
 - a. FUNdamentals
 - b. Technical Foundations
- 3. Competitive Foundations
- 4. Training to Compete
- 5. Training to Perform
- 6. Living to Win
- 7. Active for Life

Although only the later pathway models involve the terms "win" and "perform," that does not mean that winning cannot take place at the earlier stages. However, it is important that the focus is on the process and not the final outcome during the earlier stages. Ensuring that all participants have an opportunity to practice and develop their skills in game settings is an important tenet of the Long-Term Athlete Development model. That is, the focus during these early stages should be on skill and ability development for all players. This philosophy results in better individual athletes and more balanced teams, and positions teams and individuals to win through skill.

For example, coaches should not bench players or pick shooters specifically to win a game at the 14U through 18U age groups. Instead, the focus should be on how the developed skill set will allow the team to perform to the best of their abilities, consequently, trying to win with the use of skill. The end result of such a philosophy is developing skilled and experienced athletes who are able to win an Olympic gold medal, or a team that is able to win the senior National Club Championship. Failure to follow this model and philosophy may result in short-term gains (i.e. wins), but these come at the expense of long-term success (i.e. athlete and club development).

Water polo is a late specialization sport. Many athletes join the sport at 14-15 years of age. As a result, it may take some time to assess and develop these late-comers as high-performance athletes. The Long-Term Athlete Development model provides a framework specific to this late-entry sport, and establishes guidelines for identifying athlete development. According to the 10-year/10,000 hour rule, an athlete who joins the sport at 14-15 years

of age will have the skills and experience to perform at the senior international level at 24-25, which is the age where water polo athletes begin to reach their maximum potential. Late entry athletes may begin their involvement in water polo in the Active for Life pathway; however, these athletes must be given the opportunity to enter the Competitive and Excellence streams as they progress through the

Competitive Foundations and Training to Compete stages. Diverting from the water polo Long-Term Athlete Development model may result in one-sided sport-specific preparation, lack of Physical Literacy, overuse injuries, early burnout, uncompetitive international teams, and early retirement from training and competition.

The following sections outline the various stages of the Water Polo Long-Term Athlete Development model, noting the ages of participants, the philosophy for the stage, an overview of the stage, and outlining the skills to be acquired and the activities to be introduced, performed and mastered.

Active Start

Age : 0 - 6 years old (males and females)

Philosophy : Getting Wet

General Overview

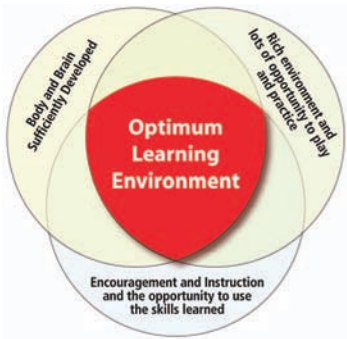
- Physical activity should be a fun part of the child's daily life
- Active play is the way young children are physically active
- During this period, children rapidly outgrow their mobility aids so communities must find effective ways (e.g. equipment swaps or rentals) to ensure that all children have access to the equipment they need to be active
- At least 30 minutes a day of organized physical activity for toddlers and at least 60 minutes a day for preschoolers
- At least 60 minutes (and up to several hours) of unstructured physical activity (i.e. active play) a day for toddlers and preschoolers (toddlers and preschoolers should not be sedentary for more than 60 minutes at a time except while sleeping)
- Provide physical activity every day regardless of weather
- Starting in infancy, provide infants, toddlers, and preschoolers with opportunities to participate in daily physical activity that promotes fitness and the development of movement skills
- Ensure that children acquire movement skills that build towards more complex movements
- Encourage basic movement skills – they do not just happen as a child grows older, but develop depending on each child's heredity, activity experiences, and environment
- Focus on improving basic movement skills such as running, jumping, twisting, wheeling, kicking, throwing, and catching
- Design activities that help children to feel competent and comfortable participating in a variety of fun and challenging sports activities
- Ensure that games for young children are non-competitive and focus on participation

- Ensure that activities are gender-neutral and inclusive so that active living is equally valued and promoted for all children

Key Factors

Figure 9 below highlights the importance of Physical Literacy and the factors that lead to an optimum learning environment. It is essential that children take part in playful physical activity at an early age to build the physical skills needed to participate in sport activities, including water polo. To ensure today's children become tomorrow's athletes, the water polo community must do its part to encourage the spread of Physical Literacy in daycares, elementary schools, households, summer camps, community club programs, etc. While children in this group simply do not have the skills required to participate in water polo, water polo groups can act as advocates in the community about the importance of the Active Start pathway to ensure future participation in sport. Investment in the athletic development of children in this age group provides an increased opportunity for these children to eventually participate in water polo activities in the Active for Life, Competitive, or Excellence streams.

Figure 9 – Optimum Learning Environment²⁸



Additional Information
Appendix 3 – Water Polo Long-Term Athlete Development
Summary Framework Matrix

²⁸ Adopted from Developing Physical Literacy, a supplement of Canadian Sport for Life.

I Love Water Polo



I Love Water Polo (ILWP) is an introductory, grass roots, water polo program for boys and girls. This program offers children the ability to learn the basic skills and the game of water polo. Moreover, the ILWP program enhances the participants' swimming, balance, and coordination skills.

ILWP is a community driven program offering various levels of skill development. ILWP coaches and instructors are trained through the National Coaching and Certification Program (NCCP) as a Community Water Polo Coach.

In the spring of 2009, WPC obtained a grant from Heritage Canada to nationalize the I Love Water Polo (ILWP) program and run a pilot in Atlantic Canada. The Ottawa Titans Water Polo Club developed the first version of ILWP, and has been operating the program in the Ottawa region since 2001. WPC has merged the core components of the ILWP Ottawa Titans program with its NCCP Community Sport – Initiation coaching program to form a National standardized ILWP.

The vision and the driving force behind the concepts of the award winning I Love Water Polo program was Mr. David Hart, Head Coach of the Titans. The Titans, with a 3-year Ontario Trillium Foundation grant to get started, trained instructors, developed lesson plans, purchased equipment, and then launched a program at five pools, later expanding to eight pools.

In May 2005 the Titan's I Love Water Polo award won an award of excellence from the Parks and Recreation Ontario (PRO). Nancy Snihur, who was the first administrative volunteer and developed the strategic plan, business case, Trillium grant application and many of the promotional material, accepted the award on behalf of the Titans.

In the spring of 2005, Ontario Water Polo (OWP) obtained a grant from the Ontario Trillium Foundation to support the Association's efforts to enhance awareness and interest in water polo, strengthen the network of water polo clubs and affiliates across Ontario, and increase access to the sport.

The I Love Water Polo model has been divided into two stages – FUNdamentals and Technical Foundations. The reason for this division is because most early start water polo athletes join the sport between the ages of 10 and 12 years old. Some athletes possess an aquatic background, while others join with no organized swimming experience. The distinction between FUNdamentals and Technical Foundations is rather small, and is based on three variables:

- chronological age
- physiological age, and
- stage of development of Physical Literacy

Coaching will play a dominant role in determining the appropriate level (FUNdamentals or Technical Foundations) that athletes should be placed in.

FUNdamentals

Age : 6 - 9 years old for males

6 - 8 years old for females

Philosophy : Fun

General Overview

- Skill development should be well-structured, positive, safe, and fun
- Create a stimulating learning environment
- Acquire and learn fundamental water polo skills
- Develop fundamental movement skills and fundamental sport skills (Physical Literacy) in a fun and safe environment that promotes self-confidence
- Introduce basic motor skills and movements through warm up activities
- Introduce basic practical knowledge leading to modified games
- Use modified and adapted equipment such as smaller nets, balls, and pool dimensions
- Introduce simple rules and ethics of the sport
- Develop self-confidence, focus, and a positive attitude
- Instil the love of sports through active participation
- Limit the information communicated to the participants to what is essential
- Coaches and instructors must be knowledgeable about child development (physical, mental and cognitive, and emotional)
- No periodization, but well structured programs and practices
- If children later decide to leave the competitive stream, the skills they acquire during the I Love Water Polo FUNdamentals stage will benefit them when they engage in recreational activities, enhancing their quality of life and health

Conditioning Activities

- Daily participation in sport and physical activities
- Development of physical literacy – the basic movement skills of three activities provide the base for all other sports
 - Athletics: run, wheel, jump, and throw
 - Gymnastics: ABCs of athleticism – Agility, Balance, Coordination and Speed
 - Swimming: for water safety reasons, for balance in buoyant environment, and the foundation for all other water-based sports

Technical Skills

Ball sport fundamentals:

- Hand-eye coordination
- Any team games
- Basic team play
- Decision making skills
- Mini Polo games

Water Polo swim skills:

- Head up front crawl
- Vertical breast stroke
- Trudgeon front crawl (front crawl with whip kick)
- Water polo backstroke
- Changing directions (zig zag)
- Roll over
- Vertical butterfly
- Sliding

Kicking skills:

- Eggbeater
- Whip kick
- Flutter

Introduction to basic ball control skills:

- Picking up the ball from underneath
- Catching
- Passing
- Shooting

Planning and Periodization

- No periodization required
- Well-planned and well-structured programs and lessons
- Appropriate skill progression
- Learning opportunities for everyone
- Positive learning environment
- Year-round active participation in a variety of sports and physical activities
- Emphasis on swimming
- Introduction to water polo through modified games and competitions

Coaching Certification and Education

- Coaches should complete Community Sport – Initiation workshop
- Understand each phase of children's physiological development
- Understand teaching progressions and age appropriate terminology
- Understand necessary modifications to games and competitions

Understand how to:

- Communicate with children
- Provide a good learning environment
- Develop self-esteem
- Give feedback to children
- Establish positive behaviour in children

- Handle difficult children
- Communicate with parents
- Provide appropriate achievement awards

Additional Information

- Appendix 1 – Physical, Mental and Cognitive, and Emotional Development Characteristics
- Appendix 3 – Water Polo Long-Term Athlete Development Summary Framework Matrix

Technical Foundations

Age : 9 - 12 years old for males

8 - 11 years old for females

Philosophy : Lay the Foundations

General Overview

- Major skill learning stage – all basic sport skills should be learned before entering Competitive Foundations (next stage)
- Introduce decision making in standard situations
- Introduce elementary tactical principles (1-on-1 situations)
- Integrated mental, cognitive, and emotional development
- Introduction to mental preparation
- Introduction to general physical fitness training using medicine balls, Swiss balls, and own body weight
- Develop motor skills
- Introduce ancillary capacities
- Ensure learning through frequency of practice and number of repetitions
- Only include what the participant needs to know to accomplish the task
- Skill learning must come under the umbrella of tactics – participants must have a clear idea of what tactical problem he/she can solve with the acquired skill set

- Block learning (controlled conditions) and random learning (mirror competition reality) must be used adequately
 - Coaches should be knowledgeable about growth development and the maturation process
 - Monitor Peak Height Velocity development in females
 - Take advantage of windows for optimal trainability of the 5 Basic Ss: Stamina (endurance), Strength, Speed, Skills and Suppleness (flexibility)
 - Athletes should spend more time training than competing
- Introduce single periodization (seasonal planning)
 - Winning is not the focus

Conditioning Activities

Focus on fundamental movements and skills:

 - ABCs – Agility, Balance, Coordination and Speed
 - RJT – Running, Jumping and Throwing
 - KGBs – Kinaesthetic, Gliding, Buoyancy and Striking with the body
 - PCKs – Passing, Catching, Kicking and Striking with an implement

Table 9 – Variety of Fundamental Movements and Skills that Underpin Physical Literacy²⁹

Travelling Skills	Object Control Skills	Balance Movements
<ul style="list-style-type: none">• Boosting• Climbing• Eggbeater• Galloping• Gliding• Hopping• Ice Picking• Jumping• Leaping• Poling• Running• Sculling• Skating• Skipping• Sliding• Swimming• Swinging• Wheeling	<p>Sending:</p> <ul style="list-style-type: none">• Kicking• Punting• Rolling (ball)• Strike (ball, puck, ring)• Throwing <p>Receiving:</p> <ul style="list-style-type: none">• Catching• Stopping• Trapping <p>Travelling with:</p> <ul style="list-style-type: none">• Dribbling (feet)• Dribbling (hands)• Dribbling (stick) <p>Receiving and Sending:</p> <ul style="list-style-type: none">• Striking (bat)• Striking (stick)• Volleying	<ul style="list-style-type: none">• Balancing/Centering• Body Rolling• Dodging• Eggbeater• Floating• Landing• Ready position• Sinking/Falling• Spinning• Stopping• Stretching/Curling• Swinging• Twisting/Turning

²⁹ Adopted from Balyi I., Cardinal C., Higgs C., Norris S., and Way R. Long-Term Athlete Development - Canadian Sport for Life, 2005.

- Make use of Swiss balls, medicine balls, stretch cord, and own body weight to develop:

 - Core strength
 - Shoulder and knee stability
 - Flexibility and stretching
 - Agility and balance
 - Technical Skills

Learning and development of water polo specific body movements:

 - Sliding
 - Sculling
 - Jumping
 - Upper body movement
 - Legs only travelling (feet to chest)

Refine water polo swim skills:

 - Head up front crawl
 - Vertical breast stroke
 - Trudgeon front crawl (front crawl with whip kick)
 - Water polo backstroke
 - Stop and go
 - Changing directions (zig zag)
 - Roll over
 - Swim stop jump
 - Spider

Legs only travelling

Vertical butterfly

Kicking skills:

 - Eggbeater
 - Whip kick
 - Flutter
- Change in body position skills:

 - Horizontal front and back to vertical
 - Vertical to horizontal front and back
 - Swimming and sliding
 - Sliding right and left – with and without ball and with faking

Ball control skills:

 - Picking up the ball from underneath and on top
 - Ball in hand swimming
 - Catching
 - Passing
 - Shooting
 - Faking

Basic goaltending skills:

 - Jumping
 - Positioning and angles in net – squaring to shooter
 - Sliding

Tactical and Game Strategy Skills

 - Basic water polo decision-making skills focusing on 1-on-1 play
 - How to play all half-court offensive and defensive positions
 - Maintaining proper offensive and defensive basic body positions (i.e. horizontal without the ball) while introducing and developing decision making skills

Planning and Periodization

 - Well-planned and well-structured programs and training sessions
 - Year-round active participation in a variety of sports and physical activities – encourage swimming and other ball-based sports

- Emphasis on learning basic skills and tactics
- Water polo season aligned with school year
- Preparatory period must be long enough to develop solid foundations followed by official competitive period
- Off-season to include involvement in other sports and physical activities
- Demonstrated belief in fair play, and the ability to instil this belief in players
- Demonstrated open and honest communication with parents and players
- Knowledge of water polo specific training principles and adaptations
- Development of team and team staffing structure

Coaching Certification and Education

- Coaches should complete the Community Sport – Initiation workshop
- Deeper understanding of technical/tactical aspects
- Age appropriate skill development progressions
- Appendix 1 – Physical, Mental and Cognitive, and Emotional Development Characteristics
- Appendix 3 – Water Polo Long-Term Athlete Development Summary Framework Matrix

Additional Information

Competitive Foundations



Age : 12 - 16 years old for males
11 - 15 years old for females

Philosophy : Build the competitive base

General Overview

- Further development of water polo specific skills
- Introduce more advanced water polo skills and tactics
- Consolidate and refine basic practical tactical and technical knowledge
- Develop decision-making abilities under pressure situations with and without ball
- Introduce game planning
- Be aware of the growth, development, and maturation process in males
- Be aware of the onset of Peak Height Velocity in both females and males, and menarche in females
- Major fitness development stage: aerobic and strength
- Integrated mental, cognitive, and emotional development
- Develop mental preparation
- Introduce free weights
- Develop ancillary capacities
- Intensity must gradually rise as to reach competition requirements (i.e. Provincial Championships and National Club Championships)
- Make sure the skill or tactic is stabilized in controlled conditions (block learning) as well as random conditions (mirror competition reality)
- The skills or tactics have to be consolidated or performed in a state of light to moderate fatigue in order to prepare the athlete adequately to the competition requirements
- The athlete has to learn to extend the limit of his/her performance capacity methodically and systematically in order to improve
- The training load must be raised gradually and progressively
- Take advantage of windows for optimal trainability of the 5 Basic Ss: Stamina (endurance), Strength, Speed, Skills and Suppleness (flexibility)
- Coaches should be knowledgeable about growth development and the maturation process
- Focus is on performance of skills in a competitive environment not on winning

Conditioning Activities

Make use of Swiss balls, medicine balls, stretch cords, and own body weight to develop:

- Core strength
- Shoulder and knee stability
- Flexibility and stretching
- Agility and balance
- Develop aerobic base through swimming, water polo swimming, and appropriate cross training activities
- Employ medicine balls and water bungies to combine conditioning and water polo skill development (water weights)
- Introduce weight training taking into account the growth and development considerations of both male and female athletes

Technical Skills

At this stage, greater emphasis should be placed on developing and perfecting the basic skills. At the same time, developing advanced skills and introducing specific and positional skills is imperative. Basic skills must be mastered at this stage before moving on to the Training to Compete pathway.

Basic water polo skills:

- Sliding
- Sculling
- Legs only travelling (feet to chest)
- Jumping over feet and fouling
- Jumping over feet to steal dry pass
- Head up front crawl with and without ball
- Ball in hand swimming forwards and backwards
- Vertical breast stroke
- Trudgeon front crawl (front crawl with whip kick)

- Water polo backstroke
- Stop and go with and without ball
- Changing directions (zig zag) with and without ball
- Roll over with and without ball
- Swim stop jump
- Spider
- Vertical butterfly

Advanced water polo skills:

- Jumping over feet and sliding (press to zone and back)
- Counter spinning
- Stunting
- Jumping over feet and attacking the ball (stealing ball from another player)
- Sliding with ball
- Sliding and faking with ball (simulating a gapping defence)
- Stealing ball and tipping left to right, right to left, left to left, and right to right
- With partner:
 - Shadow swimming with ball
 - Shadow swimming and shock as offensive player picks up the ball
 - Layout and foul (preventing offensive player from passing ball)
 - T-formation
 - Getting in front and cutting off defender on counter attack with and without ball
 - Receiving ball while swimming backwards, passer gives push passes
 - Receiving ball while swimming backwards and turning as if to shoot, passer utilizes sliding and faking before passing

Specific water polo skills:

- Jumping over feet blocking position 2/3/4 and slide back towards hole
- Jumping over feet blocking 1/5 (power play) and slide back towards post
- Blocking left arm, stroke, block with right arm
- Square blocking vertical (arm slightly bent and elbow just in front of ear), attacking shooter with support arm doing breastroke motion
- Feet to chest horizontal attack blocking (arm 60° off water), pushing water with support arm
- 5M free throw blocking³⁰
- With partner:
 - Faking and shooting (no reload and shooting with wrist), partner is in blocking position attempting to block ball (fast legs and reaction to shot)

2M Guard (centre defender) water polo skills with partner:

- Swimming in front
- Staying in front swimming and playing like a centre forward
- Defending different types of shots, attacking centre forward as they grab ball
- Getting away from grab (360° rotation)
- Getting in front when being grabbed (hook arm and rotate)
- Steal ball by hitting the arm and tipping ball
- Moving side to side in a zone defence
- Moving side to side in a zone defence with an active block (fast legs and reaction)

³⁰ When an offensive player is awarded a minor foul outside of the 5M yellow line, he/she is permitted to shoot the ball toward the goal with undue delay. As a result, it is important for athletes to understand the correct blocking technique for this situation.

Centre forward water polo skills with partner:

- Reaction towards ball and passing to perimeter players (shrugging and dishing) – focusing on speed and quickness
- Maintaining position in a zone
- Maintaining position in a front
- Getting in front of 2M guard:
 - Swim left, roll right
 - Swim right, roll left
 - Slide left, swim and roll right
 - Slide right, swim and roll left
- Shooting (left and right hand):
 - Layout (skip and bunny)
 - Backhand (cross, short, bunny)
 - Sweep (cross, short, bunny)
 - Power turn and finish strong – negative and positive
 - Power turn and finish with lob (jump vertical over goaltender and place ball in corner) – negative and positive
 - Backdoor layout shots – swimming on back away from passer (skip, bunny, lob)
- Goaltending skills:
 - Basic ready position (static, rotation, sliding)
 - Basic ready position arms out (static, rotation, sliding)
 - Sliding
 - Short and long reaction
 - Half court positioning with movement
 - Penalty kill positioning with movement
 - Sliding and defending cross pool tempo shots

- Jumping and saving hole shots (hands out ready position, quick hands):
 - High shots
 - Skip shots
 - High bunny shots
 - Short lob
 - Jumping and saving (half court and penalty kill – all positions):
 - High shots
 - Skip shots
 - Lobs
 - Bunny shots (high, medium, shoulder)

Passing Drills:

 - Basic:
 - Wrist – short and long
 - Soccer throw
 - Hand on shoulder
 - Receiving – positive and negative
 - No reload passing
 - Sliding and passing
 - Advanced:
 - High passes
 - Long passes
 - Hard passes
 - Push passes
 - Tip passes
 - Jump back
 - 3Lateral movement with faking
 - Specific:
 - Hesitation passing
 - 2/3/4 with faking and travelling (work on no reload wrist passes)
- 2/3/4 against a block defence (work on no reload wrist passes)
 - 2/3/4 against a crash defence (work on layout passing)
 - 2/3/4 against a 3-drop defence (work on sliding and arc passing)
 - Press passing (swim into defender, wet pass over the feet, turn head and layout – do not roll)
 - Wet passes into the centre forward in a press – 1/5 specifically
 - Wet passes into centre forward in a zone – 2/3/4 specifically (beating a defender 1-on-1)
 - Power play positional passing (1/2/4/5, 4/5/6, 1/2/3, etc.)
 - Power play pattern passing

Shooting Drills:

 - Basic:
 - Half-court positional shooting with and without faking
 - 2/3/4 swim in and shoot with and without faking
 - 2/3/4 slide in and shoot with and without faking
 - Tempo shooting receiving – positive and negative
 - Jumpback shooting
 - Breakaway no chaser (push shot, tip shot, sliding across net wrist shot)
 - Advanced:
 - 2/3/4 with blockers – break down defence with passing and faking
 - 1/5 with blockers (work on travelling and finding hole between goaltender and blocker)
 - High heart rate shooting
 - 5M free throw shooting
 - Shooting under pressure – with gap and/or block
 - Breakaway with a chaser
 - 2-on-1

- Specific:
 - Power play specific shooting drills (beating multiple blocks, understanding triangles)
 - Half-court specific shooting (shots under pressure with counter attack consequences)
 - Penalty shots
 - Picks and Blocks
 - 1-on-1 driving (inside water, 5M, jump back, power turns, etc.)
 - 3-on-2
 - 4-on-3

Tactical and Game Strategy Skills

 - Continue to teach all positions to all athletes (with the exception of goaltending)
 - Begin specialization of positions at later stages of Competitive Foundations
 - Introduction of water polo concepts, understanding of the game at both ends of the pool, as well as counter attack
 - Introduction of area defence and understanding of spacing on offence, defence, and transition
 - Continue to develop 1-on-1 defence while introducing the concept of team defence:
 - Press to help
 - Double back on most dangerous shooter
 - Understand the 6 quadrant concept³¹
 - Zone defence should not be employed at this level
 - Continue to enforce offensive creativity and finding open water
- Introduce set offensive plays
 - Develop a power play with a simple rotation – teaching the concepts of finding the best shooter, finding the open water, dry passes and faking, and beating the blocker (see Power Up Your Power Play in the additional resource material)
 - Teach a variety of penalty kill situations:
 - Storming
 - Blocking
 - Combination
 - L-jump
 - Introduce counter attack and defending a counter attack (should be emphasized more towards later stages of Competitive Foundation):
 - Teach area defence and swimming water polo backstroke – progression (2-on-2 and building)
 - Teach concept of filling posts on transition offence
 - 5-on-4 no chaser
 - 6-on-5 no chaser
 - Russian counter attack drill

Planning and Periodization

 - Single or double periodization
 - Year-round active participation in a variety of sports and physical activities – encourage athletes to take part in high school team sports
 - Emphasis on consolidating skills and tactics and increasing the athlete's motor repertoire
 - Water polo season aligned with school year
 - Preparatory period must be long enough to raise the performance capacity of the athletes

³¹ In the 6 quadrant concept, each defender is responsible for an area in the pool at all times. Since there are six defenders in the water, the pool is effectively divided into six quadrants, with each player responsible for defending one quadrant. Depending on the defensive system implemented, the sizing and spacing of the quadrants may be different. Each defender is responsible for defending the attacking players that enter their quadrant.

- Official competitive period of 5-6 months focusing on player development and coping with competition stress
- Off-season to include involvement in other sports and physical activities
- Demonstrated belief in fair play, and the ability to instil this belief in players
- Demonstrated open and honest communication with parents and players

Coaching Certification and Education

- Community Sport – Initiation for coaches in the Active for Life stream
- Competition – Introduction for coaches in the Competition stream
- Competition – Introduction Advanced Gradation for coaches in the Excellence stream
- Deeper understanding of technical/tactical aspects
- Understanding age appropriate skill development progressions
- Knowledge of water polo specific training principles and adaptations
- Development of club and club staffing structure
- Introduction to scouting tools and techniques
- Introduction to video analysis tools and techniques

Additional Information

- Appendix 1 – Physical, Mental and Cognitive, and Emotional Development Characteristics
- Appendix 2 – Single, Double, and Triple Periodization Models
- Appendix 3 – Water Polo Long-Term Athlete Development Summary Framework Matrix

Training to Compete



Age : 16 - 19 +/- years old for males
15 - 18 +/- years old for females

Philosophy : Competition

General Overview

- Consolidate and refine sequence of basic water polo skills at competition intensity
- Water polo and position specific physical conditioning
- Water polo and position specific technical tactical preparation
- Introduce specialization by position
- Develop consistency in implementing variants of basic skills and the new skills acquired in a competitive environment
- Increase and improve the athlete’s repertoire of skills so that, in an analogous competitive situation, the athlete is able to solve the tactical problem using different methods (skills/techniques)
- Increase the success rate of the skills executed in competition
- Increase the success rate of the basic practical tactical knowledge implemented in competition
- Develop and consolidate new practical tactical knowledge tailor made to the strengths of the athlete and team
- Improve decision-making and creative thinking abilities
- Develop game planning
- Develop the performance capacity of the athlete and team, subsequently integrating the 5 Basic Ss: Stamina (endurance), Strength, Speed, Skills and Suppleness (flexibility) to reach a peak performance at a pre-determined time of the year (periodization)
- Integrated mental, cognitive, and emotional development
- Advanced mental preparation
- Optimize ancillary capacities
- Training intensity must always be high to optimal – sub-maximal intensity will alter the motor coordination of the athlete
- In training, more time should be spent on random conditions (mirror competition requirements) than on controlled conditions (block learning)
- Be aware of the factors that influence tactical thinking when the athlete is confronted to making a decision: speed of the action taking place, quality of observation

- of athlete, experience and tactical knowledge of athlete, memory, and emotional state of the athlete
- Emphasis in training should be on cooperation, synchronization between players, and speed of execution
 - When preparing for a competition, the athlete should be aware of and focus on exploiting the tendencies (strengths, flaws and deficiencies) of the opponent
 - In competition, the athlete should concentrate on the task to do, not the outcome
 - The choice of competitions must favour athlete development
 - Introduce the athlete to international competition through Provincial and National Teams
 - Coaches have to learn how to manage an Integrated Support Team (IST)
 - Competitive focus is on winning by performing the acquired skill set

Conditioning Activities

- Goal: enhancement of aerobic base, speed, and strength
- Utilize Swiss balls, medicine balls, stretch cords, and own body weight to develop:
 - Core strength
 - Shoulder and knee stability
 - Flexibility and stretching
 - Agility and balance
- Follow water polo specific weight training plans
- Employ cross-training activities to enhance physical skills (i.e. hand-eye coordination, agility, balance, speed, strength, stamina, etc.)
- Use medicine balls and water bungies combining conditioning and water polo skill development (water weights)

Technical Skills

At this stage, greater emphasis should be placed on developing and perfecting the advanced skills. At the same time, maintenance and refinement of the basic skills, and development of the specific and positional skills is imperative. Basic and advanced skills must be perfected before an athlete can move on to the Training to Win pathway.

Basic water polo skills:

- Sliding
- Sculling
- Legs only travelling (feet to chest)
- Jumping over feet and fouling
- Jumping over feet to steal dry pass
- Head up front crawl with and without ball
- Ball in hand swimming forwards and backwards
- Vertical breast stroke
- Trudgeon front crawl (front crawl with whip kick)
- Water polo backstroke
- Stop and go with and without ball
- Changing directions (zig zag) with and without ball
- Roll over with and without ball
- Swim stop jump
- Spider
- Vertical butterfly

Advanced water polo skills:

- Jumping over feet and sliding (press to zone and back)
- Counter spinning
- Stunting
- Jumping over feet and attacking the ball (stealing ball from another player)
- Sliding with ball

- Sliding and faking with ball (simulating a gapping defence)
- Stealing ball and tipping left to right, right to left, left to left, and right to right
- With partner:
 - Shadow swimming with ball
 - Shadow swimming and shock as offensive player picks up the ball
 - Layout and foul (preventing offensive player from passing ball)
 - T-formation
 - Getting in front and cutting off defender on counter attack with and without ball
 - Receiving ball while swimming backwards, passer gives push passes
 - Receiving ball while swimming backwards and turning as if to shoot, passer utilizes sliding and faking before passing

Specific water polo skills:

- Jumping over feet blocking position 2/3/4 and slide back towards hole
- Jumping over feet blocking 1/5 (power play) and slide back towards post
- Blocking left arm, stroke, block with right arm
- Square blocking vertical (arm slightly bent and elbow just in front of ear), attacking shooter with support arm doing breastroke motion
- Feet to chest horizontal attack blocking (arm 60° off water), pushing water with support arm
- 5M free throw blocking
- With partner:
 - Faking and shooting (no reload and shooting with wrist), partner is in blocking position attempting to block ball (fast legs and reaction to shot)

2M Guard water polo skills with partner

- Swimming in front
- Staying in front swimming and playing like a centre forward
- Defending different types of shots, attacking centre forward as they grab ball
- Getting away from grab (360° rotation)
- Getting in front when being grabbed (hook arm and rotate)
- Steal ball by hitting the arm and tipping ball underneath
- Moving side to side in a zone defence
- Moving side to side in a zone defence with an active block (fast legs and reaction)

Centre forward water polo skills with partner:

- Reaction towards ball and passing to perimeter players (shrugging and dishing) – focusing on speed and quickness
- Maintaining position in a zone
- Maintaining position in a front
 - Swim left, roll right
 - Swim right, roll left
 - Slide left, swim and roll right
 - Slide right, swim and roll left
- Shooting (left and right hand):
 - Layout (skip and bunny)
 - Backhand (cross, short, bunny)
 - Sweep (cross, short, bunny)
 - Power turn and finish strong – negative and positive
 - Power turn and finish with lob (jump vertical over goaltender and place ball in corner) – negative and positive
- Backdoor layout shots – swimming on back away from passer (skip, bunny, lob)

Goaltending skills:

- Basic ready position (static, rotation, sliding)
- Basic ready position arms out (static, rotation, sliding)
- Sliding
- Short and long reaction
- Half court positioning with movement
- Penalty kill positioning with movement
- Sliding and defending cross pool tempo shots
- Jumping and saving hole shots (hands out ready position, quick hands):
 - High shots
 - Skip shots
 - High bunny shots
 - Short lob
- Jumping and saving (half court and penalty kill – all positions):
 - High shots
- Skip shots
- Lobs
- Bunny shots (high, medium, shoulder)

Passing Drills:

- Basic:
 - Wrist – short and long
 - Soccer throw
 - Hand on shoulder
 - Receiving – positive and negative
 - No reload passing
 - Sliding and passing
- Advanced:
 - High passes

- Long passes
- Hard passes
- Push passes
- Tip passes
- Jump back
- Lateral movement with faking
- Specific:
 - Hesitation passing
 - 2/3/4 with faking and travelling (work on no reload wrist passes)
 - 2/3/4 against a block defence (work on no reload wrist passes)
 - 2/3/4 against a crash defence (work on layout passing)
 - 2/3/4 against a 3-drop defence (work on sliding and arc passing)
 - Press passing (swim into defender, wet pass over the feet, turn head and layout – do not roll)
 - Wet passes into the centre forward in a press – 1/5 specifically
 - Wet passes into the centre forward in a zone – 2/3/4 specifically (beating a defender 1-on-1)
 - Power play positional passing (1/2/4/5, 4/5/6, 1/2/3, etc.)
 - Power play pattern passing

Shooting Drills:

- Basic:
 - Half-court positional shooting with and without faking
 - 2/3/4 swim in and shoot with and without faking
 - 2/3/4 slide in and shoot with and without faking
 - Tempo shooting receiving – positive and negative
 - Jumpback shooting
- Breakaway no chaser (push shot, tip shot, sliding across net wrist shot)

- Advanced:
 - 2/3/4 with blockers – break down defence with passing and faking
 - 1/5 with blockers (work on travelling and finding hole between goaltender and blocker)
 - High heart rate shooting
 - 5M free throw shooting
 - Shooting under pressure – with gap and/or block
 - Breakaway with a chaser
 - 2-on-1
 - Specific:
 - Power play specific shooting drills (beating multiple blocks, understanding triangles)
 - Half-court specific shooting (shots under pressure with counter attack consequences)
 - Penalty shots
 - Picks and Blocks
 - 1-on-1 driving (inside water, 5M, jump back, power turns, etc.)
 - 3-on-2
 - 4-on-3
- Tactical and Game Strategy Skills:
- Tactics should be based on specialization of positions
 - Development of water polo concepts, understanding of the game at both ends of the pool, as well as counter attack – become students of the game
 - Develop area defence and understanding of spacing on offence, defence, and transition:
 - Continue to develop the concept of team defence:
 - Press to help
 - Double back on most dangerous shooter
 - Understand the 6 quadrant concept
- Introduction of zones:
 - 2/3/4
 - 1/2
 - 2/3
 - 3-drop
 - Any zone and gap defence
 - Introduce combination defences:
 - Press into a specific zone
 - Understanding that the centre forward is the most dangerous position in the pool
 - Continue to emphasize offensive creativity and finding open water
 - Develop set offensive plays – understanding how to isolate best offensive players
 - Teach a systematic approach to beating zone defences
 - Develop a power play with a simple rotation – teaching the concepts of finding the best shooter, finding the open water, dry passes and faking, and beating the blocker (see Power Up Your Power Play in the additional resource material)
 - Teach a variety of penalty kill situations:
 - Storming
 - Blocking
 - Combination
 - L-jump
 - Introduce counter attack and defending a counter attack (more emphasis should be placed on transition at this stage than Competitive Foundations):
 - Teach area defence and swimming water polo backstroke – progression (2-on-2 and building)

- Develop the understanding that everyone has a role on counter defence, and it is expected that the centre forward be behind the play
- Teach concept of filling posts on transition offence
- Teach the concept of back line counter (wrestling the centre forward, and beating him/her up the pool)
- Teach concept of feeding the offence through defence – exploiting opponent’s offensive errors
- Teach how to identify odd man rushes, and how to be defensively responsible in those situations
- 5-on-4 with chaser
- 6-on-5 with chaser
- Russian counter attack drill

Planning and Periodization

- Single or double periodization
- Year-round water polo training with periodic breaks throughout the year
- Player specialization
- Emphasis on optimizing the performance factors and their integration leading to performance
- Preparatory period focuses more on specificity
- Official competition period of 6 months focusing on the development of consistency of the player and team performance
- Off-season (transition period) includes both passive and active rest

Coaching Certification and Education

- Competition – Introduction for coaches in the Active for Life stream
- Competition – Introduction Advanced Gradation for coaches in the Competition stream
- Competition – Development for coaches in the Excellence stream
- Deeper understanding of technical/tactical aspects
- Understand age appropriate skill development progressions
- Understand how to use scouting tools and techniques, video analysis, and general and specific statistical analysis
- Detailed understanding of periodization and training
- Understand physical development of strength and power – anaerobic work
- Appropriate supplementary knowledge and application (in line with National Coaching Certification Program)
- Increase complexity of team and club staff structure, with inclusion of expert Integrated Support Team
- Develop an appreciation for the development and understanding of new technologies, teaching methods, technical skills, and tactical strategies

Additional Information

- Appendix 1 – Physical, Mental and Cognitive, and Emotional Development Characteristics
- Appendix 2 – Single, Double, and Triple Periodization Models
- Appendix 3 – Water Polo Long-Term Athlete Development Summary Framework Matrix

Training to Perform



Age : 19 - 25 +/- years old for males
18 - 23 +/- years old for females

Philosophy : Road to Excellence

General Overview

- Maintain fundamental basic water polo skills
- Refine advanced skills and strategies
- Train and perfect position specific skills
- Develop position specific mental skills
- Maximize performance in competition – optimize and integrate the 5 Basic Ss: Stamina (endurance), Strength, Speed, Skills and Suppleness (flexibility), taking into account the international competitive calendar
- Develop water polo and position specific fitness training
- Maintain or improve physical capacities
- Ensure full commitment to the pursuit of international excellence
- Manage all demands related to National Team athlete's career
- Explore aspects related to athlete's post-sport career

- Model all aspects of training and performance
- Employ frequent prophylactic breaks
- Maximize ancillary capacities
- High-performance for all athletes involved at this stage
- Training is geared to integrate the performance factors to meet specific upcoming competition requirements
- More training time should be spent on random conditioning (mirror competition requirements) than on controlled conditions (block learning)
- Coaches have to be increasingly effective in managing and leading an Integrated Support Team

Conditioning Activities

- Focus: position specific conditioning
- Goal: enhancement of aerobic base, speed, and strength
- Utilize Swiss balls, medicine balls, stretch cords, and own body weight to develop:
 - Core strength
 - Shoulder and knee stability
 - Flexibility and stretching
 - Agility and balance

- Follow position specific weight training plans
- Employ cross-training activities to enhance physical skills (i.e. hand-eye coordination, agility, balance, speed, strength, stamina, etc.)
- Use medicine balls and water bungies combining conditioning and position specific development (water weights)

Technical Skills

At this stage, greater emphasis should be placed on developing and perfecting the specific and positional skills. Perfection and refinement of the basic and advanced skills is necessary for an athlete to advance to the next pathway (Living to Win).

Basic water polo skills:

- Sliding
- Sculling
- Legs only travelling (feet to chest)
- Jumping over feet and fouling
- Jumping over feet to steal dry pass
- Head up front crawl with and without ball
- Ball in hand swimming forwards and backwards
- Vertical breast stroke
- Trudgeon front crawl (front crawl with whip kick)
- Water polo backstroke
- Stop and go with and without ball
- Changing directions (zig zag) with and without ball
- Roll over with and without ball
- Swim stop jump
- Spider
- Vertical butterfly

Advanced water polo skills:

- Jumping over feet and sliding (press to zone and back)
- Counter spinning
- Stunting
- Jumping over feet and attacking the ball (stealing ball from another player)
- Sliding with ball
- Sliding and faking with ball (simulating a gapping defence)
- Stealing ball and tipping left to right, right to left, left to left, and right to right
- With partner:
 - Shadow swimming with ball
 - Shadow swimming and shock as offensive player picks up the ball
 - Layout and foul (preventing offensive player from passing ball)
 - T-formation
 - Getting in front and cutting off defender on counter attack with and without ball
 - Receiving ball while swimming backwards, passer gives push passes
 - Receiving ball while swimming backwards and turning as if to shoot, passer utilizes sliding and faking before passing

Specific water polo skills:

- Jumping over feet blocking position 2/3/4 and slide back towards hole
- Jumping over feet blocking 1/5 (power play) and slide back towards post
- Blocking left arm, stroke, block with right arm
- Square blocking vertical (arm slightly bent and elbow just in front of ear), attacking shooter with support arm doing breaststroke motion

- Feet to chest horizontal attack blocking (arm 60° off water), pushing water with support arm
 - 5M free throw blocking
- With partner:
 - Faking and shooting (no reload and shooting with wrist), partner is in blocking position attempting to block ball (fast legs and reaction to shot)

2M Guard water polo skills with partner:

- Swimming in front
- Staying in front swimming and playing like a centre forward
- Defending different types of shots, attacking centre forward as they grab ball
- Getting away from grab (360° rotation)
- Getting in front when being grabbed (hook arm and rotate)
- Steal ball by hitting the arm and tipping ball underneath
- Moving side to side in a zone defence
- Moving side to side in a zone defence with an active block (fast legs and reaction)

Centre forward water polo skills with partner:

- Reaction towards ball and passing to perimeter players (shrugging and dishing) – focusing on speed and quickness
- Maintaining position in a zone
- Maintaining position in a front
- Getting in front of 2M guard:
 - Swim left, roll right
 - Swim right, roll left
 - Slide left, swim and roll right
 - Slide right, swim and roll left

- Shooting (left and right hand):
 - Layout (skip and bunny)
 - Backhand (cross, short, bunny)
 - Sweep (cross, short, bunny)
 - Power turn and finish strong – negative and positive
 - Power turn and finish with lob (jump vertical over goaltender and place ball in corner) – negative and positive
 - Backdoor layout shots – swimming on back away from passer (skip, bunny, lob)

Goaltending skills:

- Basic ready position (static, rotation, sliding)
- Basic ready position arms out (static, rotation, sliding)
- Sliding
- Short and long reaction
- Half court positioning with movement
- Penalty kill positioning with movement
- Sliding and defending cross pool tempo shots
- Jumping and saving hole shots (hands out ready position, quick hands):
 - High shots
 - Skip shots
 - High bunny shots
 - Short lob
- Jumping and saving (half court and penalty kill – all positions):
 - High shots
 - Skip shots
 - Lobs
 - Bunny shots (high, medium, shoulder)

Passing Drills:

- Basic:
 - Wrist – short and long
 - Soccer throw
 - Hand on shoulder
 - Receiving – positive and negative
 - No reload passing
 - Sliding and passing
- Advanced:
 - High passes
 - Long passes
 - Hard passes
 - Push passes
 - Tip passes
 - Jump back
 - Lateral movement with faking
- Specific:
 - Hesitation passing
 - 2/3/4 with faking and travelling (work on no reload wrist passes)
 - 2/3/4 against a block defence (work on no reload wrist passes)
 - 2/3/4 against a crash defence (work on layout passing)
 - 2/3/4 against a 3-drop defence (work on sliding and arc passing)
 - Press passing (swim into defender, wet pass over the feet, turn head and layout – do not roll)
 - Wet passes into the centre forward in a press – 1/5 specifically
 - Wet passes into centre forward in a zone – 2/3/4 specifically (beating a defender 1-on-1)

- Power play positional passing (1/2/4/5, 4/5/6, 1/2/3, etc.)
- Power play pattern passing

Shooting Drills:

- Basic:
 - Half-court positional shooting with and without faking
 - 2/3/4 swim in and shoot with and without faking
 - 2/3/4 slide in and shoot with and without faking
 - Tempo shooting receiving – positive and negative
 - Jumpback shooting
 - Breakaway no chaser (push shot, tip shot, sliding across net wrist shot)
- Advanced:
 - 2/3/4 with blockers – break down defence with passing and faking
 - 1/5 with blockers (work on travelling and finding hole between goaltender and blocker)
 - High heart rate shooting
 - 5M free throw shooting
 - Shooting under pressure – with gap and/or block
 - Breakaway with a chaser
 - 2-on-1
- Specific:
 - Power play specific shooting drills (beating multiple blocks, understanding triangles)
 - Half-court specific shooting (shots under pressure with counter attack consequences)
 - Penalty shots
 - Picks and Blocks
 - 1-on-1 driving (inside water, 5M, jump back, power turns, etc.)
 - 3-on-2
 - 4-on-3

Tactical and Game Strategy Skills

Tactics should be developed based on the team's strengths. For example, teams that are strong in swimming should implement a strategy that draws upon that strength. Exercises should align with this strategy, and all practices should support the chosen system. System play takes several years to develop. As a result, coaches and athletes must be patient and adaptive when implementing the chosen system.

- Perfect water polo concepts, understand the game at both ends of the pool, as well as counter attack – become students of the game
- Perfect the concept of team defence:
 - Press to help
 - Double back on most dangerous shooter
 - Understand the 6 quadrant concept
- Perfect the notion and understanding of zone defence
- Perfect combination defences:
 - Zone into a press
 - Press into a zone
 - Zone into an different zone
- Continue to enforce offensive creativity and finding open water
- Develop set offensive plays – understanding how to isolate best offensive players
- Teach a systematic approach to beating press and zone defences
- Teach and implement a variety of penalty kill situations, depending on the opponent
- Develop multiple power plays with complex movements – focus on the principles of finding the best shooter, finding the open water, dry passes and faking, and beating the blocker (see Power Up Your Power Play in the additional resource material)

- Emphasize counter attack and defending a counter attack
- Develop a specific counter attack pattern that fits within the parameters of the total system
- Develop a specific counter defence that fits within the parameters of the total system
- Perfect the notion of area defence and offence during transition:
 - Everyone has a role on counter defence, and it is expected that the centre forward be behind the play
 - Understand how to identify odd man rushes, and how to be defensively responsible in those situations
 - Understand how to fill posts on transition offence
 - Understand how to finish back line counter (wrestling the centre forward, and beating him/her up the pool)
 - Understand how to feed the offence through defence – exploiting opponent's offensive errors
- 6-on-5 with chaser
- Russian counter attack drill

Planning and Periodization

- Single, double, or triple periodization
- Year-round staggered water polo season, providing National Team athletes multiple competitive playing opportunities
- Intent is for National Team athletes to peak for major international events (Olympics, World Championships, Pan American Games, and qualifying events)
- Player specialization
- Emphasis on optimizing the performance factors and their integration leading to performance
- Preparatory, competition, and transition periods are dependant on the international competition calendar
- Off-season (transition period) includes both passive and active rest

Coaching Certification and Education

- Competition – Introduction Advanced Gradation for coaches in the Competition stream
- Competition – Development for coaches in the Excellence stream
- Deeper understanding of technical/tactical aspects
- Understand how to make use of scouting tools and techniques, video analysis, and general and specific statistical analysis
- Detailed understanding of periodization and training
- Understanding of physical development of strength and power – anaerobic work

- Appropriate supplementary knowledge and application (in line with National Coaching Certification Program)
- Increase complexity of team and club staff structure, with inclusion of expert Integrated Support Team
- Develop an appreciation for the development and understanding of new technologies, teaching methods, technical skills, and tactical strategies

Additional Information

- Appendix 1 – Physical, Mental and Cognitive, and Emotional Development Characteristics
- Appendix 2 – Single, Double, and Triple Periodization Models
- Appendix 3 – Water Polo Long-Term Athlete Development Summary Framework Matrix

Living to Win



The sole difference between the Living to Win and Training to Perform stages is that all emphasis is placed on National Team athletes and professional or semi-professional league play. The athletes are at the final stage of their high-performance careers and have reached their physical and mental peak; consequently, the goal is to win Olympic and World Championship gold medals. At this stage, the Competitive stream has been eliminated, and all athletes still playing are in the Active for Life or Living to Win pathways.

Age : 25+ (20+) years old for males
23+ (20+) years old for females

Philosophy : Excellence

General Overview

- Maintain fundamental basic water polo skills
- Refine advanced skills and strategies
- Train and perfect position specific skills
- Develop position specific mental skills
- Maximize performance in competition, optimize and integrate the 5 Basic Ss: Stamina (endurance),

- Strength, Speed, Skills and Suppleness (flexibility), taking into account the international competitive calendar
- Develop water polo and position specific fitness training
- Maintain or improve physical capacities
- Ensure full commitment to the pursuit of international excellence
- Manage all demands related to National Team athlete's career
- Explore aspects related to athlete's post-sport career
- Model all aspects of training and performance
- Employ frequent prophylactic breaks
- Maximize ancillary capacities
- High-performance for all athletes involved at this stage
- Training is geared to integrate the performance factors to meet specific upcoming competition requirements
- More training time should be spent on random conditioning (mirror competition requirements) than on controlled conditions (block learning)
- Coaches have to be increasingly effective in managing and leading an Integrated Support Team

Conditioning Activities

- Focus: position specific conditioning
- Goal: enhancement of aerobic base, speed, and strength
- Utilize Swiss balls, medicine balls, stretch cords, and own body weight to develop:
 - Core strength
 - Shoulder and knee stability
 - Flexibility and stretching
 - Agility and balance
- Follow position specific weight training plans
- Employ cross-training activities to enhance physical skills (i.e. hand-eye coordination, agility, balance, speed, strength, stamina, etc.)
- Use of medicine balls and water bungies combining conditioning and position specific development (water weights)

Technical Skills

At this stage, the majority of skills training should be placed on developing and perfecting specific and positional skills. Maintenance and refinement of the basic and advanced skills is important and useful during conditioning activities.

Basic water polo skills:

- Sliding
- Sculling
- Legs only travelling (feet to chest)
- Jumping over feet and fouling
- Jumping over feet to steal dry pass
- Head up front crawl with and without ball
- Ball in hand swimming forwards and backwards
- Vertical breast stroke
- Trudgeon front crawl (front crawl with whip kick)

- Water polo backstroke
- Stop and go with and without ball
- Changing directions (zig zag) with and without ball
- Roll over with and without ball
- Swim stop jump
- Spider
- Vertical butterfly

Advanced water polo skills:

- Jumping over feet and sliding (press to zone and back)
- Counter spinning
- Stunting
- Jumping over feet and attacking the ball (stealing ball from another player)
- Sliding with ball
- Sliding and faking with ball (simulating a gapping defence)
- Stealing ball and tipping left to right, right to left, left to left, and right to right
- With partner:
 - Shadow swimming with ball
 - Shadow swimming and shock as offensive player picks up the ball
 - Layout and foul (preventing offensive player from passing ball)
 - T-formation
 - Getting in front and cutting off defender on counter attack with and without ball
 - Receiving ball while swimming backwards, passer gives push passes
 - Receiving ball while swimming backwards and turning as if to shoot, passer utilizes sliding and faking before passing

Specific water polo skills:

- Jumping over feet blocking position 2/3/4 and slide back towards hole
- Jumping over feet blocking 1/5 (power play) and slide back towards post
- Blocking left arm, stroke, block with right arm
- Square blocking vertical (arm slightly bent and elbow just in front of ear), attacking shooter with support arm doing breastroke motion
- Feet to chest horizontal attack blocking (arm 60° off water), pushing water with support arm
- 5M free throw blocking
- With partner
 - Faking and shooting (no reload and shooting with wrist), partner is in blocking position attempting to block ball (fast legs and reaction to shot)

2M Guard water polo skills with partner:

- Swimming in front
- Staying in front swimming and playing like a centre forward
- Defending different types of shots, attacking centre forward as they grab ball
- Getting away from grab (360° rotation)
- Getting in front when being grabbed (hook arm and rotate)
- Steal ball by hitting the arm and tipping ball underneath
- Moving side to side in a zone defence
- Moving side to side in a zone defence with an active block (fast legs and reaction)

Centre forward water polo skills with partner:

- Reaction towards ball and passing to perimeter players (shrugging and dishing) – focusing on speed and quickness

- Maintaining position in a zone
- Maintaining position in a front
- Getting in front of 2M guard:
 - Swim left, roll right
 - Swim right, roll left
 - Slide left, swim and roll right
 - Slide right, swim and roll left
- Shooting (left and right hand):
 - Layout (skip and bunny)
 - Backhand (cross, short, bunny)
 - Sweep (cross, short, bunny)
 - Power turn and finish strong – negative and positive
 - Power turn and finish with lob (jump vertical over goaltender and place ball in corner) – negative and positive
- Backdoor layout shots – swimming on back away from passer (skip, bunny, lob)

Goaltending skills:

- Basic ready position (static, rotation, sliding)
- Basic ready position arms out (static, rotation, sliding)
- Sliding
- Short and long reaction
- Half court positioning with movement
- Penalty kill positioning with movement
- Sliding and defending cross pool tempo shots
- Jumping and saving hole shots (hands out ready position, quick hands):
 - High shots
 - Skip shots
 - High bunny shots
 - Short lob

- Jumping and saving (half court and penalty kill – all positions):
 - High shots
 - Skip shots
 - Lobs
 - Bunny shots (high, medium, shoulder)

Passing Drills:

- Basic:
 - Wrist – short and long
 - Soccer throw
 - Hand on shoulder
 - Receiving – positive and negative
 - No reload passing
 - Sliding and passing
- Advanced:
 - High passes
 - Long passes
 - Hard passes
 - Push passes
 - Tip passes
 - Jump back
 - Lateral movement with faking

Specific:

- Hesitation passing
- 2/3/4 with faking and travelling (work on no reload wrist passes)
- 2/3/4 against a block defence (work on no reload wrist passes)
- 2/3/4 against a crash defence (work on layout passing)
- 2/3/4 against a 3-drop defence (work on sliding and arc passing)

- Press passing (swim into defender, wet pass over the feet, turn head and layout – do not roll)
- Wet passes into the centre forward in a press – 1/5 specifically
- Wet passes into centre forward in a zone – 2/3/4 specifically (beating a defender 1-on-1)
- Power play positional passing (1/2/4/5, 4/5/6, 1/2/3, etc.)
- Power play pattern passing

Shooting Drills:

- Basic:
 - Half-court positional shooting with and without faking
 - 2/3/4 swim in and shoot with and without faking
 - 2/3/4 slide in and shoot with and without faking
 - Tempo shooting receiving – positive and negative
 - Jumpback shooting
 - Breakaway no chaser (push shot, tip shot, sliding across net wrist shot)
- Advanced:
 - 2/3/4 with blockers – break down defence with passing and faking
 - 1/5 with blockers (work on travelling and finding hole between goaltender and blocker)
 - High heart rate shooting
 - 5M free throw shooting
 - Shooting under pressure – with gap and/or block
 - Breakaway with a chaser
 - 2-on-1
- Specific:
 - Power play specific shooting drills (beating multiple blocks, understanding triangles)
 - Half-court specific shooting (shots under pressure with counter attack consequences)

- Penalty shots
- Picks and Blocks
- 1-on-1 driving (inside water, 5M, jump back, power turns, etc.)
- 3-on-2
- 4-on-3

Tactical and Game Strategy Skills

Tactics should be developed based on the team's strengths. For example, teams that are strong in ball handling skills should implement a strategy that draws upon that strength. Exercises should align with this strategy, and all practices should support the chosen system. System play takes several years to develop. As a result, coaches and athletes must be patient and adaptive when implementing the chosen system.

- Perfect water polo concepts – understand the game at both ends of the pool, as well as counter attack – become students of the game
- Perfect the concept of team defence:
 - Press to help
 - Double back on most dangerous shooter
 - Understand the 6 quadrant concept
 - Perfect the notion and understanding of zone defence
- Perfect combination defences:
 - Zone into a press
 - Press into a zone
 - Zone into an different zone
- Continue to enforce offensive creativity and finding open water
- Develop set offensive plays – understanding how to isolate best offensive players
- Teach a systematic approach to beating press and zone defences

- Teach and implement a variety of penalty kill situations, depending on the opponent
- Develop multiple power plays with complex movements – focus on the principles of finding the best shooter, finding the open water, dry passes and faking, and beating the blocker (see Power Up Your Power Play in the additional resource material)
- Emphasize counter attack and defending a counter attack
- Develop a specific counter attack pattern that fits within the parameters of the total system
- Develop a specific counter defence that fits within the parameters of the total system
- Perfect the notion of area defence and offence during transition:
 - Everyone has a role on counter defence, and it is expected that the centre forward be behind the play
 - Understand how to identify odd man rushes, and how to be defensively responsible in those situations
 - Understand how to fill posts on transition offence
 - Understand how to finish back line counter (wrestling the centre forward, and beating him/her up the pool)
 - Understand how to feed the offence through defence – exploiting opponent's offensive errors
 - 6-on-5 with chaser
 - Russian counter attack drill

Planning and Periodization

- Single, double, or triple periodization
- Year-round staggered water polo season, providing National Team athletes multiple competitive playing opportunities
- Coordinate training so that National Team athletes peak for major international events (Olympics, World Championships, Pan American games, and qualifying events)

- Player specialization
 - Emphasis on optimizing the performance factors and their integration leading to performance
 - Preparatory, competition, and transition periods are dependant on the international competition calendar
 - Off-season (transition period) includes both passive and active rest
- Detailed understanding of periodization and training
 - Understanding of physical development of strength and power – anaerobic work
 - Appropriate supplementary knowledge and application (in line with National Coaching Certification Program)
 - Increase complexity of team and club staff structure, with inclusion of expert Integrated Support Team
 - Develop an appreciation for the development and understanding of new technologies, teaching methods, technical skills, and tactical strategies

Coaching Certification and Education

- Competition – High-Performance
 - Deeper understanding of technical/tactical aspects
 - Understand how to use scouting tools and techniques, video analysis, and general and specific statistical analysis
- Additional Information**

 - Appendix 2 – Single, Double, and Triple Periodization Models

Appendix 3 – Water Polo Long-Term Athlete Development Summary Framework Matrix

Active for Life



Age : Enter at any age

Philosophy : Water Polo for Life

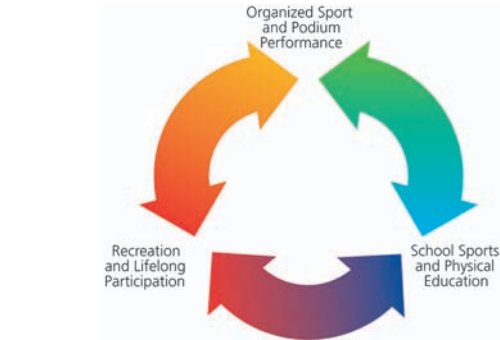
General Overview

- Enter and leave Active for Life stage at any age
- Transfer from one sport to another
- Move from highly competitive sport to life-long competitive sport through age group competition
- Minimum of 60 minutes of moderate daily activity or 30 minutes of intense activity for adults
- Move to careers in sport or volunteering
- Athletes are more likely to become Active for Life if physical literacy is achieved before the Competitive Foundations stage
- A positive experience in sport is the key to retaining athletes after they leave the competition stream
- Water Polo clubs must make a paradigm shift from simply cutting athletes at the Training to Compete, Training to Perform, and Living to Win stages to re-directing them to sports where they are pre-disposed to train and perform well

Key Factors

- Water Polo Canada must create recreational/ community playing opportunities for all age groups, not just the Competition and Excellence streams
- Encourage and educate athletes to become coaches, referees, administrators/volunteers
- Create multiple Masters age groups to keep adults Active for Life and involved in water polo in other capacities
- Develop a strong alumni program and Water Polo Canada Hall of Fame to allow Water Polo Canada to stay connected to and honour its retired athletes, hopefully keeping them involved in the sport

Figure 10 – Circle of a Physically Active Life³²



32 Adopted from Balyi I., Cardinal C., Higgs C., Norris S., and Way R. Long-Term Athlete Development - Canadian Sport for Life, 2005.

The successful development of the Active for Life pathway is critical to Water Polo Canada's goal to increase the amount of registered members and enhance the sport's exposure outside its current tight-knit community. The expansion of enrollment and widening exposure in the community will contribute to the development of a sustainable high-performance program, and an increase in the number of coaches, officials, administrators/volunteers and support staff within clubs, the National Team, Provincial Sport Organizations, and the National Sport Organization. To do this, it is extremely important that Water Polo Canada infiltrate the physical education programs at the elementary, high school, and Quebec

CEGEP levels. Involving athletes in water polo from an early age and keeping them Active for Life will allow the sport to grow to new levels in Canada.

Coaching Certification and Education

It is recommended that coaches be trained as a Community Sport or Competition – Introduction coach.

Additional Information

Appendix 1 – Physical, Mental and Cognitive, and Emotional Development Characteristics

Appendix 3 – Water Polo Long-Term Athlete Development Summary Framework Matrix

Training and Competition

The prevailing thought within water polo has been that frequent competition is the best way for young athletes to develop into quality players in the latter parts of their careers. This thinking is correct in the sense that the objective of each coach should be to produce athletes who are able to compete at the highest level. However, in many respects, this philosophy and approach is short-sighted and does not lead to a robust program or a healthy sport.

Coaches at the under 16 (16U) and 18 (18U) under age groups often focus solely on winning the National Club Championships, and therefore select their teams based on early maturing athletes. Additionally, these coaches will only allow the top 8 players on a team of 15³³ to compete during the "important" games, and employ practices like allowing the less experienced participants to shoot rather than teaching and incorporating a sustainable defensive system. This focus on winning in the short-term comes at the expense of developing a successful long-term program and keeping participants involved in the sport over an extended period of time. Only a select group of athletes (the early maturers) are being selected for competitive teams, and of those, only the best among them actually play during important games. This practice excludes a significant portion of the club's population base (average or late maturers), and fails to provide them with an opportunity to play competitive water polo. As sport research has shown that late maturers often have a better chance to succeed in a sport (they are forced to pay more attention to fundamentals early on to succeed, and grow into their bodies and skills upon maturation), it is irresponsible for teams to exclude these individuals from participating at competitive levels. By engaging in this process, we are limiting involvement in the sport, not giving athletes the opportunity to grow and hurting future National Teams by keying in on a small subset of participants for inclusion on competitive teams. This

33 Water Polo Canada sanctioned events allow teams to dress up to 15 players. FINA only allows a maximum of 13 to be dressed per game.

approach is short-sighted and detrimental to the sport and its athletes.

Changing this process to involve average and late developing athletes and shifting the focus from winning now to developing athletes and teams capable of winning in the future³⁴ will pay tremendous dividends as we attempt to grow the sport of water polo in Canada.

The Active for Life pathway is the key ingredient in ensuring the growth of water polo in Canada. Encouraging the participation of individuals of all ages in water polo activities will translate into a more sustainable high-performance program, and an increased number of coaches, officials, administrators, volunteers and support staff at the club, provincial, national, and National Team levels. To achieve this increased level of participation in physical education and extra-curricular activities, it is important that water polo increase its exposure at the elementary school, high school, and Quebec college system levels. Encouraging greater participation at earlier levels and ensuring that these athletes remain active in Water Polo Canada activities will allow the sport of water polo to grow to new heights in Canada, and ultimately result in greater international success.

For the Long-Term Athlete Development program to succeed, attention must be paid to the windows of optimal training for the 5 Basic Ss: Stamina (endurance), Strength, Speed, Skills and Suppleness (flexibility). During the Active Start and I Love Water Polo phases, a significant emphasis must be placed on Physical Literacy. Fundamental movement and sport skills must be developed during the Physical Literacy stage, while basic and advanced water polo skills must be perfected during the Competitive Foundations and Training to Compete stages.

34 Shifting the emphasis from winning now to developing athletes to win in the future does not mean that winning at younger age groups should not be taught. The principle behind Long-Term Athlete Development is that skill development contributes to the process of how to win, and that short-term success and tactics should not sacrifice the long-term athlete development process.

Table 10 below illustrates amount of focus to be placed on training and competition in the eight pathways in the Long-Term Athlete Development program.

Table 10 – Optimal Training to Competition Ratios

Pathway	Training	Competition
ACTIVE START	100%	0%
I LOVE WATER POLO FUNDAMENTALS	70%	30%
I LOVE WATER POLO TECHNICAL FOUNDATIONS	60%	40%
COMPETITIVE FOUNDATIONS	50%	50%
TRAINING TO COMPETE	40%	60%
TRAINING TO PERFORM	30%	70%
LIVING TO WIN	25%	75%
ACTIVE FOR LIFE	20%	80%

Training is defined as goggle swimming, core/ stability and weight training, and technical water polo skill development.

Competition is defined as all sanctioned (league, tournament, National Club Championships, etc.) and non-sanctioned (exhibition, joint training, etc.) games, scrimmages, power play/penalty kill, counter attack scenarios, and game scenario drills. (It is important to understand that counter attack scenarios are dependent upon the stage of Long-Term Athlete Development. For example, a 3-on-2 can be viewed as game scenario at the Competitive Foundation pathway, while it would qualify as a technical skill at the Living to Win pathway.)

Game scenario is defined as a situation where technical skills are incorporated into a setting where the athlete is forced to make a pressured decision with multiple options.

Understanding the definition of competition is imperative. Currently, athletes are provided with a variety of competition opportunities, but not enough training. Table 10 provides recommended training and competition ratios, and is useful in developing yearly programs (macrocycles). However, these ratios will deviate within each phase and mesocycle of yearly plans as indicated by the technical/tactical ratios in the periodization models in Appendix 2.

During the Active Start and I Love Water Polo phases, the emphasis is on building skills. As a result, more time is spent in training than in competition during these stages. Once basic skills have been acquired, involvement shifts from training activities to a balance between training and competition activities at the Competitive Foundations stage. As athletes progress from the Training to Compete to the Training to Perform and Living to Win stages, the emphasis increasingly shifts to competition. Participants in the Active for Life pathway should be playing almost all of the time. This pathway is designed to retain athletes in the sport who do not wish to train competitively. Under the Long-Term Athlete Development program, these individuals will hopefully transition into roles as coaches, officials, and/or administrators and volunteers. Keeping participants involved means playing often. Creating competitive and high-performance athletes means finding the right balance between training and competition, with the intent of creating sustainable long-term success at the senior level.

Training can be broken down further into three categories: swimming, dry land, and water polo. Table 11 below illustrates the distribution of training activities to be employed in each of the eight pathways in the Long-Term Athlete Development program.

Table 11 – Trident Training

Pathway	Swimming	Dry Land	Water Polo
ACTIVE START	30%	70%	0%
I LOVE WATER POLO FUNDAMENTALS	30%	50%	20%
I LOVE WATER POLO TECHNICAL FOUNDATIONS	30%	40%	30%
COMPETITIVE FOUNDATIONS	15%	20%	65%
TRAINING TO COMPETE	15%	20%	65%
TRAINING TO PERFORM	30%	15%	55%
LIVING TO WIN	30%	15%	55%
ACTIVE FOR LIFE	10%	15%	75%

Swimming is defined as lap swimming with goggles.

Dry Land is defined as core/stability and weight training outside of the water.

Water Polo is defined as technical skill development such as routines/water polo swimming with and without the ball, passing, shooting, etc.

Since both fundamental movement skills and fundamental sport skills are developed during the Active Start, FUNdamentals, and Technical Foundations stages, a large portion of training during these stages should focus on developing the ABCs (Agility, Balance, Coordination and Speed), KGBs (Kinaesthetic, Gliding, Buoyancy and Striking with the body), RJT (Running, Jumping and Throwing), and PCKs (Passing, Catching, Kicking and Striking with an implement) out of the water. In addition, the first speed, stamina, and skill

windows are best developed during the Physical Literacy stages. As a result, coaches must emphasize swimming as part of the training routine to capitalize on the window of optimal training for stamina and speed. Furthermore, swimming is considered one of the fundamental movement skills according to Table 8 (When and Where Children Learn and Practice Fundamental Motor Skills) and Table 9 (Variety of Fundamental Movements and Skills that Underpin Physical Literacy) above (in the Physical Literacy and FUNdamentals sections).

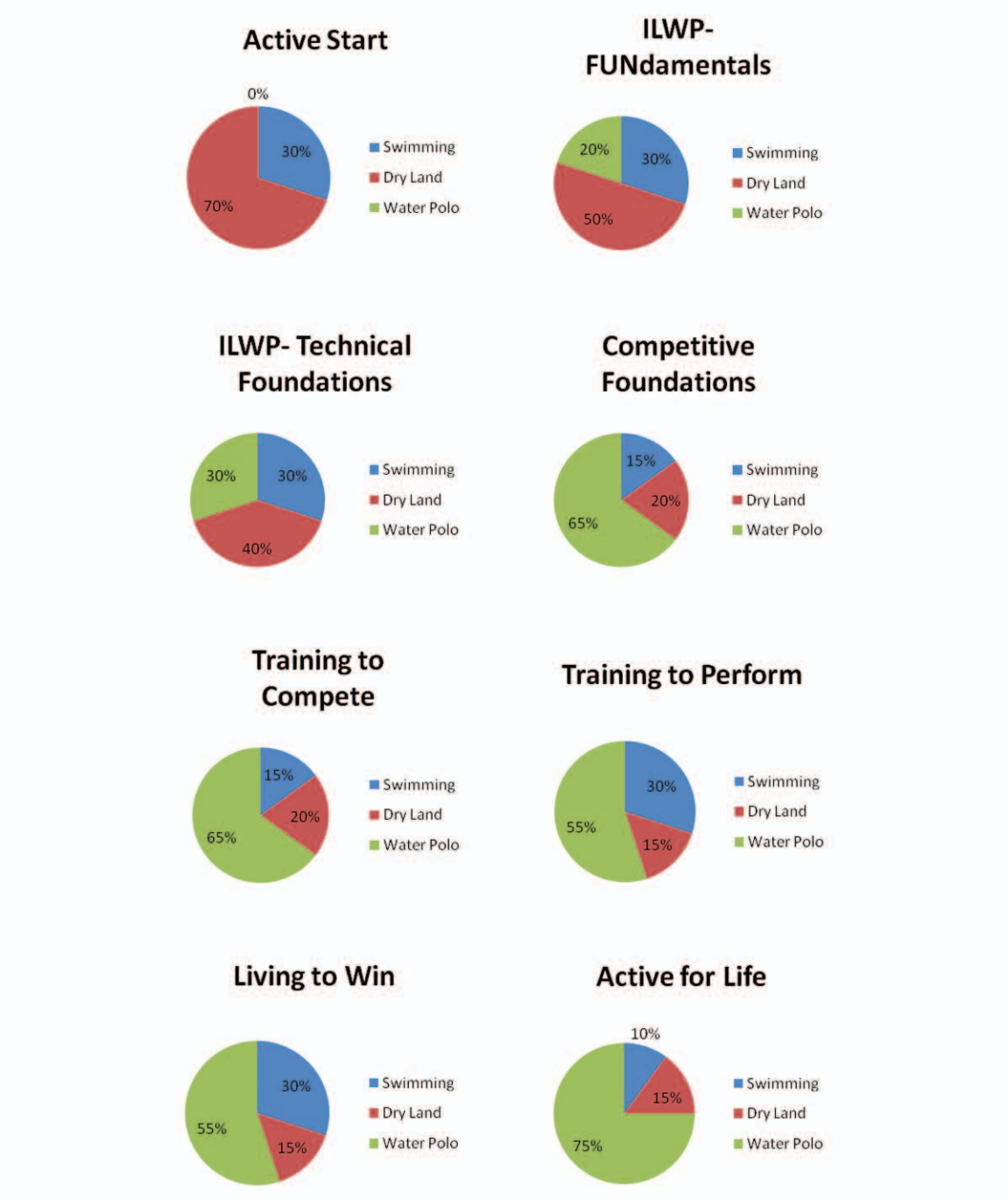
In the Competitive Foundations and Training to Compete stages, the objective is to perfect the basic and advanced technical skills. As a result, a greater emphasis should be placed on water polo training rather than goggle swimming. During these stages, conditioning goals can be accomplished through water polo swimming (lap swimming using a water polo ball and emphasizing water polo skills). During the Training to Perform and Living to Win stages, however, a shift back towards swimming conditioning occurs. High-performance athletes must be at a world-class conditioning level, which can be accomplished more efficiently through goggle swimming.

Dry land training is important at all stages; however, each pathway has a different objective. Developing fundamentals occurs early on, which is why the early stages involve a high proportion of dry land training. The percentage of dry land training decreases as athletes mature because dry land training shifts to intensity training in the form of weight training and specific core/stability activities.

The amount of training time increases as an athlete moves through the Long-Term Athlete Development pathways. As a result, while lower percentages of training time are dedicated to dry land training at the later levels of the pathway, the amount of time dedicated to dry land training is higher than perceived.

Figure 11 – Trident Training Pie Charts

The final factor influencing the training process is the relationship between volume, intensity, and frequency.



Volume is the quantitative component of the training program. The volume of activity is defined by the duration (i.e. length of time) and/or length of the exercise (i.e. distance).

Intensity is the qualitative component of the training regimen. Intensity is measured through heart rate and contains all activities within a given unit of time.

Frequency refers to the number of workouts within a given time frame, usually per the microcycle. Frequency relates to the loading period within the mesocycle. Within the mesocycle (e.g. a mesocycle with a 3:1 loading to recovery ratio), the frequency of training should increase over the three week loading period. For example, four practices in week 1, five practices in week 2, and six practices in week 3. During the final week of the mesocycle (week 4 in this example), the training frequency should be reduced to allow the athlete significant recovery time to increase their aerobic training level during the next mesocycle.

To develop aerobic capacity, a high volume and low intensity workout regimen is ideal. Participants should be at the low to mid range of their target heart rate zone performing exercises that last over two minutes in length. Those exercises that last just over two minutes should be performed repeatedly with a short recovery time during repetitions (e.g. ten seconds). As the length of the exercise increases, the amount of repetitions may decrease while the recovery time may increase slightly (e.g. no more than twenty seconds).

When training the anaerobic alactic and lactic energy systems, workouts should be structured using a low volume and high intensity regimen. When training anaerobic capacity, athletes require significant amounts of rest during sets. The shorter the duration and the higher the intensity of the activity, the longer the rest required. Depending on the macrocycle phase, and the objective of the mesocycle, active rest may be used rather than passive rest. When attempting to build speed, passive rest should be used. However, when the objective is conditioning, then activities such as light passing, for example, may be incorporated as rest during the anaerobic exercise. The frequency employed is related to the loading-recovery ratio within the mesocycle.

The Competition System

The current competition structure forces athletes to travel large distances to receive quality competition

opportunities. Moreover, the costs associated with this level of travel are substantial. It can cost more than \$25,000 for a team to travel across the country, which is equivalent to the salary of a full-time coach. As a result, the current structure of invitational, provincial, and national tournaments is prohibitive and does not promote membership growth.

Additionally, current training programs do not employ the optimal training to competition ratios scientifically proven to benefit athlete development. The current competition structure does not fit within a proper periodization plan that allows athletes to progress through the phases of General Preparation, Specific Preparation, Pre-Competition, Competition, and Transition. During the General Preparation Phase, a team may be forced to travel and spend large sums of money competing in tournaments where emphasis is placed on winning rather than focusing on development. In these cases, the focus of training leading up to the event will be placed on tactical development, which is considered competition rather than skills development. As a result, the current ad hoc system of tournaments that are placed on the calendar based on history and pool time availability do not take into account a proper periodization plan designed for athlete growth and development.

Moreover, many water polo athletes currently compete in multiple age categories, which often results in imbalanced competition to training ratios due to the fact that they often participate in tournaments in different categories in consecutive weeks. As a result of this reality, athletes will compete more often than they train, which is in stark opposition to the values of the Long-Term Athlete Development pathway model, and undermines the development of highly-skilled future National Team athletes.

Water Polo Canada is currently assembling a competition review committee that will include National Team coaches, Water Polo Canada staff, Provincial Sport Organizations, and experts in the sport. The goal of this committee will be to replace the existing ad hoc competition structure with a new competition system that supports the growth of water polo in Canada, the development of sustainable National Team programs, the integration of scientifically proven optimal training to competition ratios, and the development of a systematic periodization model for each stage of the Water Polo Long-Term Athlete Development model.

Implementation of Long-Term Athlete Development

Canada's large geographic base has a significant impact on the Canadian sport scene. Lack of population density results in isolated programs and thinly spread resources from coast to coast. This structure creates a considerable financial burden on families who wish to enroll their children in high-performance sports. As a result, programs like the Junior National Water Polo Team become defined by who can afford to pay rather than who deserves to play. The Long-Term Athlete Development pathway model provides a mechanism for dealing with these economic and population density concerns, and supplies the tools for building a robust program that supports Active for Life and high-performance athlete programs.

Implementation of the Water Polo Canada Long-Term Athlete Development model will involve several steps. The first step will focus on major metropolitan areas (Vancouver, Calgary, Toronto, Ottawa and Montreal) and smaller regional areas with existing water polo programs. To succeed in this implementation, Water Polo Canada must build on what is already established before expanding. With limited finances and resources, Water Polo Canada cannot afford to spread itself too thinly.

As a result, each Provincial Sport Organization will be responsible for growing the sport in the remote areas of their province. These efforts will be supported by Water Polo Canada sport development programs and initiatives, but the administration of these programs will be carried out provincially.

Implementation of the Long-Term Athlete Development pathway will be a step-by-step process that could take up to three to four Olympic cycles to reach full implementation. Phase 1 of the implementation involves rolling out the Water Polo Long-Term Athlete Development model and educating individuals associated with water polo (coaches, referees, administrators, volunteers, participants) about the value of this model and how it addresses the strengths, weaknesses and concerns of the current water polo landscape in Canada. Phase 2 involves the creation of a competition review committee that will be responsible for redesigning the current competition

structure to fit within the parameters of the Long-Term Athlete Development concepts. At the same time, the I Love Water Polo program must be adopted and implemented by all communities. The successful implementation of the Long-Term Athlete Development pathway requires the development of desire and passion in young children, which is predicated on developing Physical Literacy. The best way to develop Physical Literacy with an eye toward growing water polo is to integrate the I Love Water Polo program into all community recreational programming schedules. Ultimately, I Love Water Polo must become a community driven and supported initiative through scholastic and community pool programs, rather than a micro-managed program led by Water Polo Canada and Provincial Sport Organizations.

Water Polo Canada will hold regional meetings with coaches, officials, administrators, and Provincial Sport Organizations to create regionally specific implementation plans. Each Major Metropolitan Area and smaller region has unique strengths and weaknesses, and a generic approach to implementation will not necessarily meet the needs of each region.

It is important to note the existence of several possible obstacles or barriers that will impact the implementation of the Long-Term Athlete Development pathway model. These potential obstacles include the following:

Financial

Implementing the Long-Term Athlete Development pathway will incur significant costs, including the costs of holding meetings across the country, printing reference materials, creating a Water Polo Canada Long-Term Athlete Development website, developing instructional DVDs, and the distribution of other resource materials.

Resistance

Personnel who have been utilizing a coaching philosophy over a long period of time may be resistant to the introduction of the Long-Term Athlete Development philosophy.

Lack of cooperation from local communities

For Water Polo Canada to integrate into community recreational programming, elementary, secondary, and Quebec CEGEP physical education and extracurricular programs, these organizations must buy in to the Long-Term Athlete Development model and support the initiative.

National Team training centres

National Team coaches must be willing to establish multiple training centres and distribute carding monies³⁵ evenly across Canadian universities to help promote Canadian Interuniversity Sport and retain and develop athletes past the age of 18 in the Canadian system.

Lack of Canadian sport scholarships

Unlike Canadian universities, American universities have the ability to offer athletic scholarships to attract the

³⁵ Sport Canada employs an Athlete Assistance Program (AAP) that transfers funds directly to high-performance athletes identified by each National Sport Organization to ensure their continued ability to participate in high-performance athletics. To participate in this funding program, teams must conduct an annual audit of their high-performance athletes for review by Sport Canada. The amount of AAP cards available for a sport is dependant upon the performance of the respective men's and women's National Teams at major international events.

best athletes to their water polo programs. The growth of the Canadian Interuniversity Sport water polo league will suffer if top Canadian athletes elect to pursue free educational programs in the United States.

Availability and cost of pool space

Physical infrastructure capacity will always be a problem for Canadian water polo clubs. It is very difficult for most clubs to appropriate prime time³⁶ pool hours, which come at a higher than average price tag. Given limited pool availability, clubs have a tendency to focus solely on the Excellence stream of athletes rather than growing the Active for Life and Competitive streams.

Lack of capacity

Currently, there are not enough personnel – coaches, officials, administrators and volunteers – to implement the Long-Term Athlete Development program across Canada. Increasing the amount of athletes requires coaches. Increasing the amount of games requires officials. Increasing the amount of clubs, leagues, and tournaments requires administrators and volunteers. To grow the sport, an increased people infrastructure is required.

³⁶ Prime time pool hours are usually weekdays between 5:00 p.m. and 8:00 p.m.

Conclusion

Long-Term Athlete Development is a philosophy and vehicle for change. This athlete-centered program encompasses a child's first involvement in Physical Literacy programs to the transition to life-long physical activity and other sport related activities. It establishes a clear development pathway from playground to podium to being Active for Life. It also provides guidelines for planning optimal performances for all stages of athlete development.

Water Polo Canada has developed a comprehensive Long-Term Athlete Development pathway model based on past and present successes and failures. This model integrates the concept and philosophies of the generic Long-Term Athlete Development model and includes the appropriate adaptations for our unique sport. This model addresses the key issues surrounding water polo, and provides a blueprint to eliminate these problems and grow the sport within the Canadian culture.

It is imperative that all coaches, administrators, volunteers, and officials support the Long-Term Athlete Development principles. This process requires a significant commitment from all parties, and may take three to four Olympic cycles before reaching its potential.

Long-Term Athlete Development provides the framework and all of the necessary tools to change Canadian water polo culture, expand our athlete base, and create a sustainable competition structure that provides adequate training and competitive opportunities for all athletes regardless of age, gender, or skill level. Focusing on regional growth, particularly in Major Metropolitan Areas, will be the key to successful implementation. At the same time, we must create a better pathway to keep senior and retiring National Team athletes involved in Water Polo Canada as coaches, officials, administrators, volunteers, and/or alumni sponsors.

Corporate funding and funding from the Own the Podium (OTP) program are performance driven, while funding from Sport Canada is sport participation and development driven. Consequently, an improved domestic infrastructure is necessary to increase our funding from these sources, as a robust national program based on strong local clubs working together towards a common goal (increased participation and an advanced high-performance program) will result in both national and international success. To achieve this national and international success, water polo in Canada requires a sustainable base. Without it, the high-performance program will crumble and will continue to eat away at the club system through centralization. Canada was the only men's team at the Beijing Olympics without a national professional league or a high-performance Interuniversity league. Without an enhanced competition structure that allows top-tier athletes to compete against one another in a format that promotes athletic development and growth, the men's team will continue to lag behind other national programs. The women's National Team is currently ranked second in the world, and has consistently ranked in the top six since its formation in the early 1980s. However, this has been accomplished without the presence of a professional league or a high-performance Interuniversity league. Moreover, recent National Club Championships have revealed parity between clubs across the country. Through these successes, it is obvious that Canada possesses talented water polo athletes and coaches. It is critical that we build on and reinforce these recent successes through the implementation of a sound philosophy that encourages participation at all levels and promotes athlete development across the country through a defined development program. To that end, Water Polo Canada and its key stakeholders must adopt the Long-Term Athlete Development pathway model to grow the sport in Canada and continue to establish a presence on the international stage.

Selected Bibliography

Abbott A., Collins D., Martindale R., Sowerby K., Fundamental Movement Abilities Chart, Talent Identification and Development, An Academic Review, Sport Scotland University of Edinburgh 2002.

Alpine Integration Model. Alpine Canada Alpine, High-performance Advisory Committee, 1999.

Armstrong, N. and Welsman, J. Young People and Physical Activity. Oxford University Press, Oxford, 1997.

Armstrong, N. and Welshman, J. Children in Sport and Exercise. British Journal of Physical Education, 28(2). Pp. 4-6, 1997.

Balyi, I. and Way, R. "Long-Term Planning of Athlete Development. The Training to Train Phase". B.C. Coach, 1995. pp. 2 - 10.

Balyi, I. Sport system building and long-term athlete development in Canada. The situation and solutions, in Coaches Report. The Official Publication of the Canadian Professional Coaches Association. Summer 2001. Vol.8, No.1, pp.25-28.

Balyi, I., "Long-term Planning of Athlete Development, Multiple Periodisation, Modeling and Normative Data" in FHS, The UK's Quarterly Coaching Magazine, Issue Four, pp. 7 - 9. May, 1999.

Balyi, I., "Long-term Planning of Athlete Development, The Training to Train Phase" in FHS, The UK's Quarterly Coaching Magazine, Issue One, pp. 8 - 11. September, 1998.

Balyi, I., "Long-term Planning of Athlete Development, The Training to Compete Phase" in FHS, The UK's Quarterly Coaching Magazine, Issue Two, pp. 8 - 11, December, 1998.

Balyi I, Cardinal C, Higgs C, Norris S, and Way R, Long-Term Athlete Development, Canadian Sport for Life, 2005.

Balyi, I., and Hamilton, A. Long-term Athlete Development, Trainability and Physical Preparation of Tennis Players. In: Strength and Conditioning for Tennis.

Eds. Reid, M., Quinn, A. and Crespo, M. ITF, London. 2003. pp. 49-57.

Balyi, I., and Hamilton, A. "Long-term Planning of Athlete Development, The Training to Win Phase" in FHS, The UK's Quarterly Coaching Magazine, Issue Three, pp. 7 - 9. April, 1999.

Bar-Or, O. Pediatric Sport Medicine for the Practitioner: From Physiologic Principles to Clinical Applications. New York: Springer Verlag, 1983.

Bar-Or, O. Developing the Prepubertal Athlete: Physiological Principles. In Troup, J.P., Hollander, A.P., Strasse, D., Trappe, S.W., Cappaert, J.M. and Trappe, T.A. (Eds.), Biomechanics and Medicine in Swimming VII., London: E & FN Spon. pp. 135-139, 1996.

Bar-Or, O. Nutritional Considerations for the Child Athlete. Canadian Journal of Applied Physiology. 26(Suppl.), pp. 186-191. 2001.

Bar-Or, O. (ed). The Child and the Adolescent Athlete. Balckwell Science Ltd. Oxford, UK, 1996.

Belov, E. "For Those Starting Artistic Gymnastics". Translated material of the Canadian Gymnastic Federation. 1995.

Blimkie, C.J.R and Marion, A. "Resistance Training during Preadolescence: Issues, Controversies and Recommendations". Coaches Report, Vol.1. No.4.1994. pp.10-14.

Blimkie, C.J.R. and Bar-Or, O. "Trainability of Muscle Strength, Power and Endurance during Childhood". In. Bar-Or, O. ed., The Child and Adolescent Athlete. London: Blackwell Scientific Publications, 1996.

Bloom, B. Developing Talent in Young People. New York: Ballantines, 1985.

Bompa, T. From Childhood to Champion Athlete. Toronto. Veritas Publishing Inc. 1995

Bouchard, C., Malina, R.M., Perusse, L. 1997. Genetics of Fitness and Physical Performance. Champaign, IL: Human Kinetics.

Calgary Health Region, 3 Cheers for the Early Years (2004). Snactivity box: Activities for promoting healthy eating and active living habits for young children. Retrieved November 22, 2004, from www.calgaryhealthregion.ca/hecomm/nal/child/DaycareToolkit.pdf

Canadian Child Care Federation. (2001). Supporting your child's physical activity (Resource Sheet #52). Retrieved November 22, 2004, from www.cfc-efc.ca/docs/cccf/rs052en.htm

Dick, Frank W., Sports Training Principles, London, Lepus Books, 1985

Docherty, D. Trainability and Performance of the Young Athlete. Victoria: University of Victoria, 1985.

Dozois, E.. (2002, November). Calgary Health Region Daycare Project: Focus group report. Prepared for the Calgary Health Region's 3 Cheers for the Early Years. Calgary, AB: Calgary Health Region.

Drabik, J. Children and Sport Training. Stadion, Island Pond, Vermont. 1996.

Ericsson, K.A. and Charness, N. Expert Performance. Its Structure and Acquisition. American Psychologist, August 1994., pp. 725-747.

Ericsson, K.A., Krampe, R.Th. and Tesch-Romer. The role of deliberate practice in the acquisition of expert performance. Psychological Review, 1993, 100. pp. 363-406.

Gladwell, M. Outliers: The Story of Success. (Little Brown and Company, New York: 2008)

Lynn, M. A. T., & Staden, K. (2001, Fall). The obesity epidemic among children and adolescents. WellSpring 12 (2), 5–6.

Hansford, C., Fundamental Movements, Presented British Canoe Union, National Conference, Nottingham Dec. 2004.

Harsanyi, L."A 10-18 éves atleták felkészítésének modellje." Budapest: Utanpotlas-neveles, No.10, 1983.

Haywood, K.M. Life Span Motor Development. Champaign, IL. Human Kinetics, 1993.

Health Canada. (2002a, November 22). Statistics & public opinion. Canada's physical activity guides for children and youth. Retrieved December 8, 2004, from www.phacaspc.gc.ca/pau-uap/pagguide/chilyouth/media/stats.html

Health Canada. (2002b, November 22). Canadian Paediatric Society, College of Family Physicians and Canadian Teachers' Federation call for urgent action to boost physical activity levels in children and youth. Canada's physical activity guides for children and youth. Retrieved December 8, 2004, from www.phacaspc.gc.ca/pau-uap/pagguide/child_youth/media/release.html and www.centre4activeliving.ca/Publications/WellSpring/2004/December.html#Snactivity accessed January 10, 2005.

History of Water Polo, Wikipedia, http://en.wikipedia.org/wiki/History_of_water_polo

International Gymnastics Federation. Age Group Development Program. CD Rom. 2000.

MacDougall, J.D., Wenger, H.A. and Green, H.J. (Eds) Physiological Testing of the Elite Athlete. Movement Publications, Inc. Ithaca N.Y., 1982.

Malina, R.M. and Bouchard, C. Growth, Maturation, and Physical Activity. Champaign, Ill.: Human Kinetics, 1991.

McWhorter, W., Wallman, H. W., & Alpert, P. T. (2003). The obese child: Motivation as a tool for exercise. Journal of Pediatric Health Care, 17, 11–17.

Nadori, L. Az edzés elmélet és modszeretana. Budapest: Sport, 1986.

National Association for Sport and Physical Education. (2002). Active start: A statement of physical activity guidelines for children birth to five years. Reston, VA: American Alliance for Health, Physical Education, Recreation & Dance.

National Coaching and Training Centre: Building Pathways in Irish Sport. Towards a plan for the sporting health and well-being of the nation. Limerick, Ireland, 2003.

Norris, S.R., & Smith, D.J. 2002. Planning, Periodization, And Sequencing of Training And Competition: The Rationale For A Competently Planned, Optimally Executed Training And Competition Program, Supported By A Multidisciplinary Team. In M. Kellmann (Ed.), Enhancing Recovery: Preventing underperformance in athletes, pp.121-141. Champaign, IL: Human Kinetics.

Periodization, Planning for Peak Performance, <http://www.aball-ypi.com/periodization.htm>

Periodized Workout Routine for the Strength/Power Athlete, Weight-Lifting Workout Routines, <http://www.weight-lifting-workout-routines.com/workout-routine-7.html>, 2006

Ready Set Go (n.d.). Ready set go: The sports web site for families. Retrieved November 22, 2004, from www.readysetgo.org

Report of the Minister of State's (Sport) Workgroup on Sport for Persons with a Disability, 2004.

Ross, W.D. and Marfell-Jones, M.J. Kinanthropometry. In: Physiological Testing of the Elite Athlete. Eds. MacDougall, J.D., Wenger, H.A., and Green, H.J. Movement publications, Ithaca, N.Y., 1982. pp. 75 – 104.

Rowland, T., and Boyajian, A. Aerobic Response to Endurance Training in Children. Medicine and Science in Sports and Exercise, 26(5) Supplement.

Rushall, B. The Growth of Physical Characteristics in Male and Female Children. In Sports Coach, Vol.20, Summer, 1998. pp. 25 – 27.

Sanderson, L. "Growth and Development Considerations for the Design of Training Plans for Young Athletes". Ottawa: CAC, SPORTS, Vol.10.No.2.1989.

Siff M C, Periodization Breakdown?, Perform Better, http://www.performbetter.com/catalog/matriarch/OnePiecePage.asp_Q_PageID_E_82_A_PageName_E_ArticleSiffPeriodization

Sports Periodization, Wikipedia, http://en.wikipedia.org/wiki/Sports_periodization#History, May 9, 2008

Tanner, J.M. "Growing Up." Scientific American, 1973, 9.

Tanner, J.M. Foetus into Man Physical Growth from Conception to Maturity, Second Edition, Castlemead Publications, Ware, England, 1989.

Thumm, H-P. "The Importance of the Basic Training for the Development of Performance" New Studies in Athletics, Volume 1. pp.47-64, 1987.

Tihanyi, J. Long-Term Planning for Young Athletes: An Overview of the Influences of Growth, Maturation and Development. Sudbury: Laurentian University, 1990.

Valentine, J. (2003, Winter). Don't children get all the exercise they need from playing? WellSpring 14 (1), 6–8.

Viru, A. Loko, J., Volver, A., Laaneots, L., Karlesom, K. and Viru, M. Age periods of accelerated improvements of muscle strength, power, speed and endurance in age interval 6-18 years. In "Biology of Sport", Warsaw, V., 15 (4) 1998, 211-227 pp.

Viru, A. Adaptation in Sports Training. CRC Press, Boca Raton, 1995. 310.p.

Vorontsov, A.R. Patterns of Growth for Some Characteristics of Physical Development: Functional and Motor Abilities in Boy Swimmers 11 – 18 Years. In: Biomechanics and Medicine in Swimming VIII. Eds. Keskinen, K.L., Komi, P.V. and Hollander, A.P. Jyväskylä, Gunners, 1999.

Vorontsov, A.R. Multi-Year Training of Young Athlete as Potential Modifier of Growth and Development (Analysis of some biological concepts). Sport Medicine in Aquatic Sports – the XXI Century, FINA World Sport Medicine Congress, 2002.

Wienek, J. Manuel d'entraînement. Paris: Vigot, 1990.

Appendix 1 : 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.

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-mascular 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.

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.

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.

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.

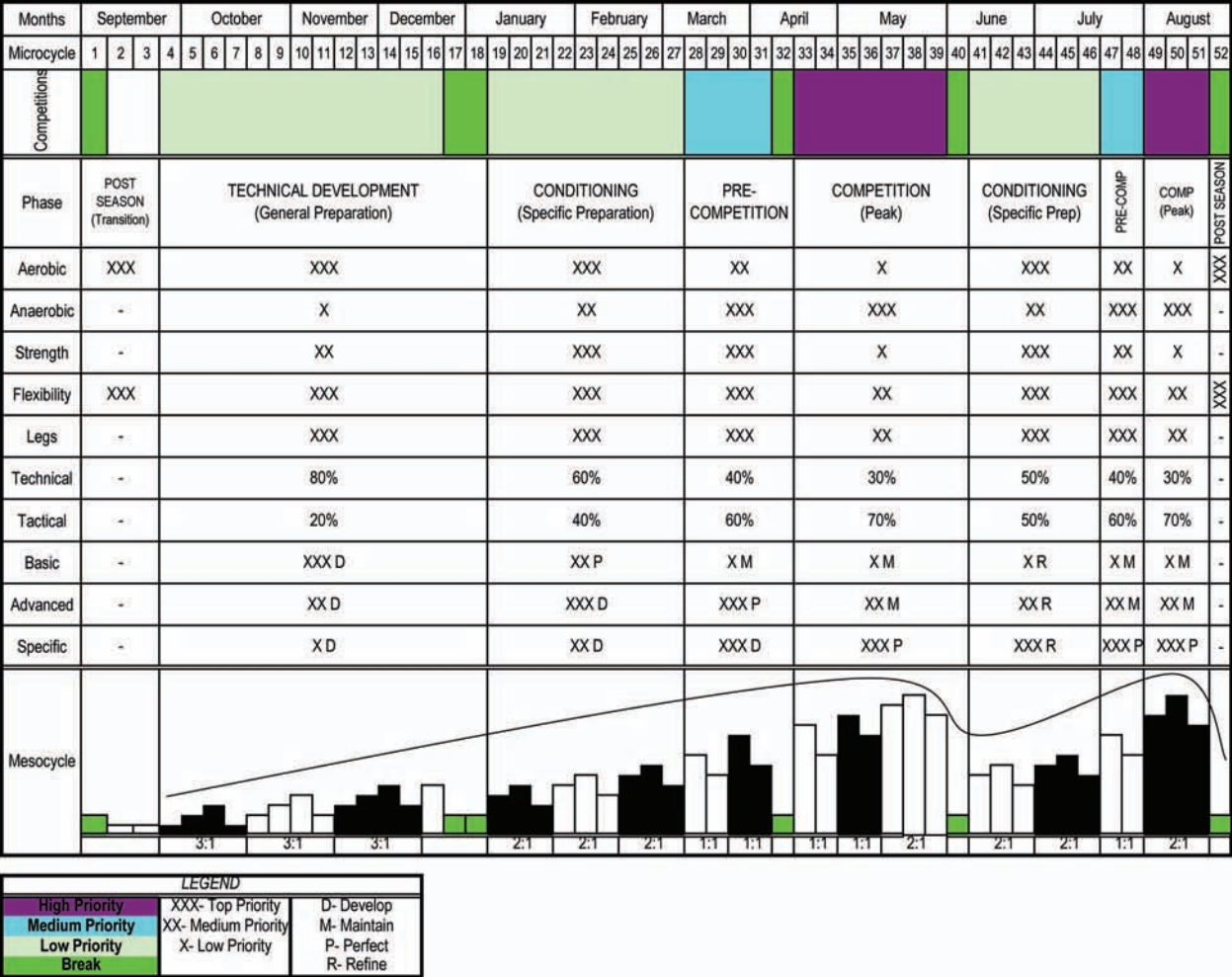
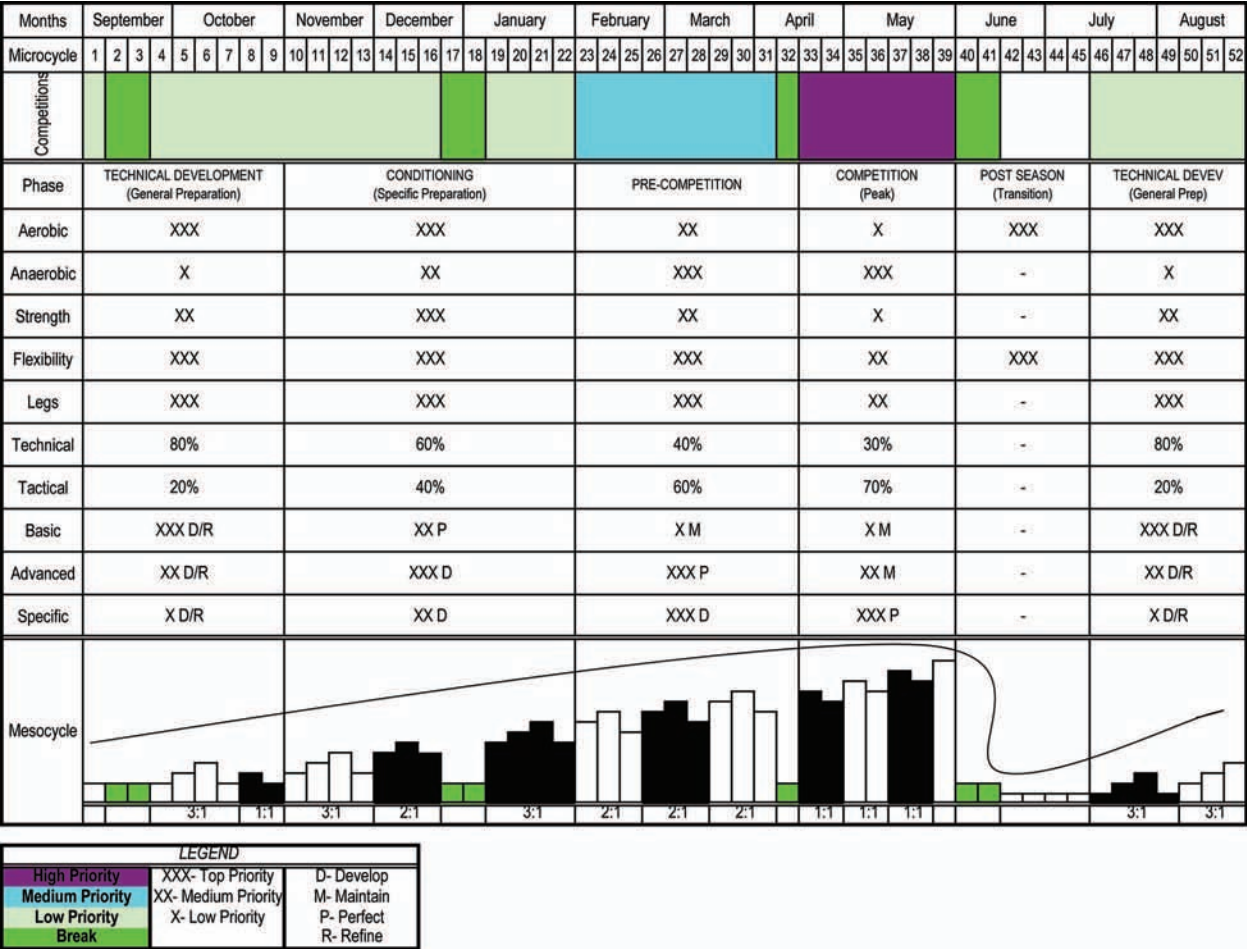
Late Adolescence - Emotional Development		
Basic characteristics	General impact on performance	Implications for the coach
Major decisions about examinations, universities, and employment work have to be made.	There are 'pulls' on time and energy.	Build in prophylactic breaks. Be aware of external pressures. 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.

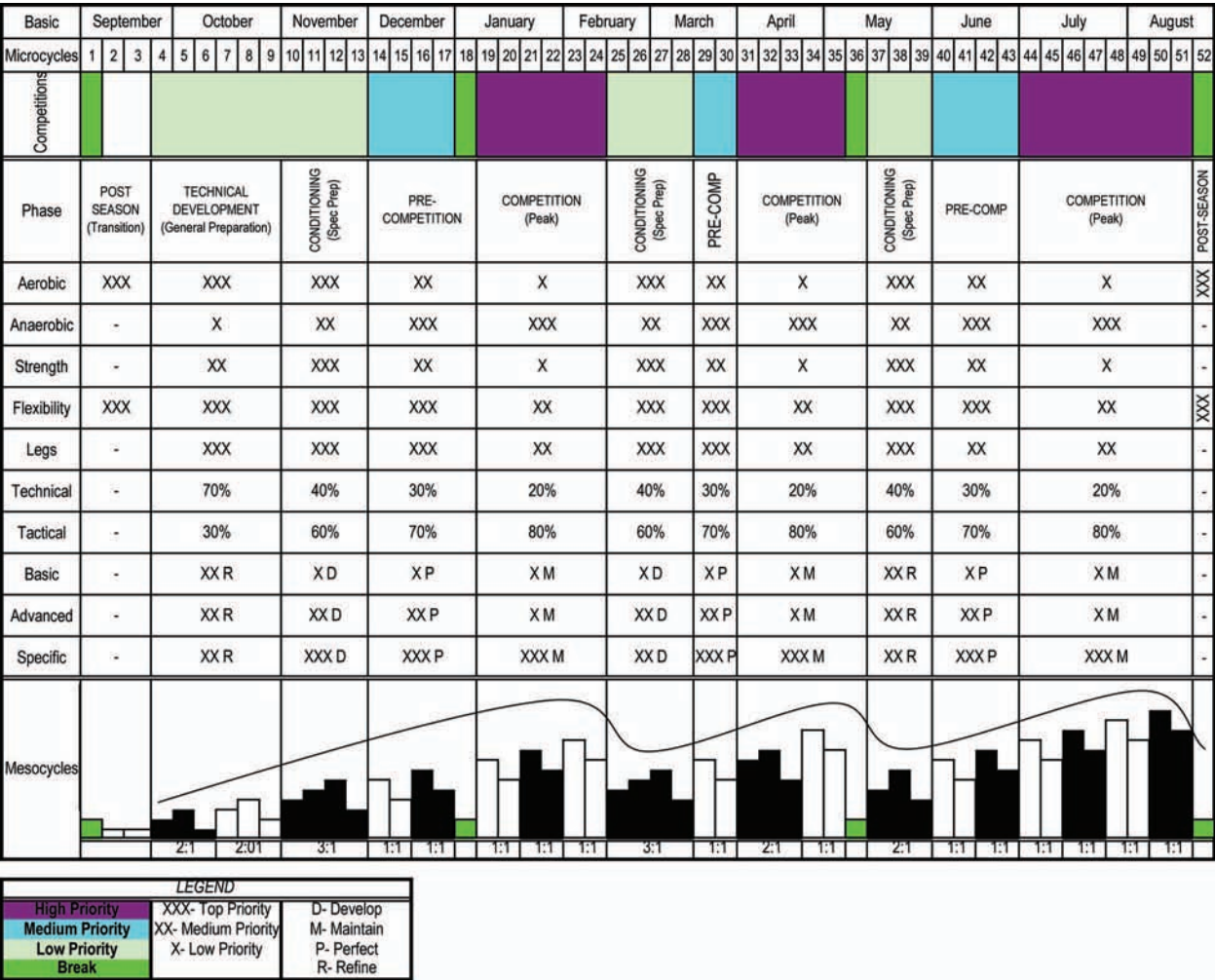
Early Adulthood - Physical Development		
Basic characteristics	General impact on performance	Implications for the coach
Physiologically, the body reaches maturity during this stage.	All physiological systems are fully trainable.	Ensure that physical training programs employ the most advanced techniques 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.

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.

Appendix 2 : Single, Double, and Triple Periodization Models





Appendix 3 : Water Polo Canada Long-Term Athlete Development Framework Matrix

PATHWAY	ACTIVE START	I LOVE WATER POLO		COMPETITIVE FOUNDATIONS	TRAINING TO COMPETE	TRAINING TO PERFORM	LIVING TO WIN	ACTIVE FOR LIFE		
		FUNDAMENTALS	TECHNICAL FOUNDATIONS							
Male	0-6 years old	6-9 years old	9-12 years old	12-16 years old	16-19 +/- years old	19-25 +/- years old	25+ (20+) years old	Enter at any age		
Female	0-6 years old	6-8 years old	8-11 years old	11-15 years old	15-18 +/- years old	18-23 +/- years old	23+ (20+) years old	Enter at any age		
Stage of Maturation	Early Childhood	Late Childhood		Early Puberty	Late Puberty	Early Adulthood	Adulthood			
		Active for Life								
Philosophy	Getting Wet	Fun	Lay the Foundations.	Build the Competitive Base	Competition	RTE (Road to Excellence)	Excellence	Polo for Life		
Primary Objective	Learn fundamental movements and link them together into play	Learn all fundamental movement skills and build overall motor skills	Learn overall sports skills	Build an aerobic base, develop speed and strength, and further develop and consolidate sport specific skills	Optimize the engine and learn to compete	Own the Podium	Gold Medal Performances	A smooth transition from an athlete's competitive career to lifelong physical activity and participation in water polo		
Guiding Principles	Create a love for water activities	Fun, safety, and active participation are of primary importance	Athletes must be actively engaged in the activity; motor and cognitive wise	Intensity must be gradually raised to reach competition requirements	Training intensity must always be high to optimal. Sub-maximal intensity will alter the motor coordination of the athlete	Modeling all possible aspects of training and performance	Modeling all possible aspects of training and performance	Create water polo opportunities for all ages- player, coach, administrator, volunteer, and official		
Time Commitment	Progressive participation in aquatic activities	Regular participation in aquatic activities	2-4 hrs/week; 1-2 water polo sessions	3-6 hrs/week; 1-3 water polo sessions	3-6 hrs/week; 1-3 water polo sessions	12-15 hrs/week; 5-6 water polo sessions-including dry land	20-25 hrs/week; 8-11 water polo sessions-including dry land	3-6 hrs/week; 1-3 water polo sessions		
				10-12 hrs/week; 5-6 water polo sessions-including dry land	12-15 hrs/week; 5-6 water polo sessions-including dry land	15-18 hrs/week; 6-8 water polo sessions-including dry land				
				12-15 hrs/week; 6-8 water polo sessions-including dry land	15-18 hrs/week; 6-8 water polo sessions-including dry land	18-20 hrs/week; 6-8 water polo sessions-including dry land				
Conditioning Time Commitment	N/A	N/A	1.5 hrs/week; 3 dry land sessions	1 hr/week; 2 dry land sessions	1 hr/week; 2 dry land sessions	4.5 hrs/week; 3 dry land sessions	6 hrs/week; 4 dry land sessions	Optional Recommended: 30 mins/day		
			Extra dry land above and beyond is highly recommended	3 hrs/week; 3 dry land sessions	3 hrs/week; 3 dry land sessions	3 hrs/week; 3 dry land sessions			4 hrs/week; 3 dry land sessions	6 hrs/week; 4 dry land sessions
Conditioning Objectives	Active play in a safe and challenging environment should always be fun, and part of the child's daily life	Daily participation in sport and physical activities. Fundamental movement skills; athletics, gymnastics, swimming	Fundamental motor skills: ABCs, RJT, KGBs, & PCKs	General physical fitness (balance)	General and specific physical fitness related to the demands of water polo.	Specific physical fitness related to position	Specific physical fitness related to position	General physical fitness; be active on land and in the water		

Growth & Development Considerations- PHV	Lay the foundation for future success in skills development, by helping children enjoy being active, learning to move efficiently, and improving coordination and balance	Emphasis on development of generic sport skills 1st speed window- agility & quickness: girls 8-8 yrs old; boys 7-9 yrs old	Emphasis on skill development Peak motor coordination (PMCV): girls 11 yrs old; boys 12 yrs old Suppleness window- flexibility: 6-10 yrs old	Emphasis on stamina (endurance) at the onset of PHV Onset of PHV: girls 12-13 yrs old; boys 14-15 yrs old 2nd speed window (alactic): girls 11-13 yrs old; boys 13-16 yrs old	Emphasis on peak strength development Make use of ancillary capacities	Further development of stamina, speed, strength, skill, and suppleness Make use of ancillary capacities	Further development of stamina, speed, strength, skill, and suppleness Make use of ancillary capacities	No specific growth and development considerations Understand where athlete lies on the player pathway Make use of ancillary capacities
	Build strong bones and muscles, improve flexibility, develop good posture, improve fitness, promote a healthy body weight, reduce stress, and improve sleep	Suppleness window- flexibility: 6-10 yrs old	2nd speed window (alactic): girls 11-13 yrs old	Optimal strength window: girls immediately after PHV or at the onset of the menarche- roughly 13-17 yrs old	Optimal strength window: boys 12-18 months after PHV- roughly 15-19 yrs old			
			Special attention to suppleness during PHV. Aerobic capacity training is recommended before athletes reach PHV. Aerobic power should be introduced progressively after growth rate declines.					
Mental and Cognitive Development	Create neural connections across multiple pathways in the brain particularly when rhythmic activities are involved	Use imagination to develop visualization skills Introduction to team development	Introduce and reinforce positive visualization Elements of team cohesion	Reinforce positive visualization Introduction to goal setting: individual and team; shared leadership	Attention and emotional control (consolidate) Stress management and coping strategies (consolidate)	Self identification- what kind of player am I and what is my role within the team Attention and emotional control and stress management (consolidate)	Self identification- what kind of player am I and what is my role within the team Attention and emotional control and stress management (consolidate)	Positive, fun, and stress free environment Team building activities
	Enhance development of brain function, coordination, social skills, gross motor skills, emotional development, leadership, and imagination	Make use of elementary language to guide decision making Team building activities	Make use of elementary language to guide decision making Team building activities	Mental rehearsal: game situations- individual and team; greater independence Develop decision making abilities: game situation and out of pool responsibilities	Pre-game, game, and post-game routines (refinement) Visualization and decision making (refinement) Leadership, team dynamics, and independence (consolidate)	Pre-game, game, and post-game routines (refine and consolidate) Visualization, goal setting, and decision making (refine) Communication skills with media, sponsors, and VIPs	Pre-game, game, and post-game routines (refine and consolidate) Visualization, goal setting, and decision making (refine) Communication skills with media, sponsors, and VIPs	Self-esteem and confidence building Communication- working with others
	Help children to build confidence and develop self-esteem	Communication- working with others	Develop communication skills and understanding	Team building activities				
Purpose of Competition	N/A	Participation	Concentration on skill development	Concentration on skill development	Development of tactical game play	Individual and team targets relevant to long-term goals	Individual and team targets relevant to long-term goals	Provide playing opportunities for people of all ages
		Short games	Very simple game play	Tryouts within competition context	Application of techniques within competition context	Building domestic competitive system through exposure to highest level of water polo available in Canada	Building domestic competitive system through exposure to highest level of water polo available in Canada	Participation
		Few rules	Adapted rules and equipment	Progression of base tactics	Individual and team targets relevant to long-term goals	Promotion of water polo through CIS		Modified game rules
			Introduction of base tactics	Introduction to elite level domestic competition	Introduction to International competition			

Types of Competition	N/A	No structured or formal competition	No formal competition structure Modified games Incorporate skill development within competitions	Community and high school leagues	Community and high school leagues	Regional club leagues, Provincial Championships, National Club Championships, & CIS	Semi-pro or professional league play, & National Team (Sen A & Dev)	Community, high school regional club, and masters leagues
				Regional club leagues, Provincial Championships, & Regional Club Championships	Regional club leagues, Provincial Championships, & National Club Championships	Regional club leagues, Provincial Championships, National Club Championships, & CIS		
				National Development Centres, National Championships, and Provincial Programs.	National Development Centres, Canada Games, and FINA Junior World Championships	Semi-pro or professional league play, & National Team (Sen A, Dev, & FISU)		
Planning & Periodization	No periodization	No periodization	No periodization	Single or double periodization	Single or double periodization	Double or triple periodization	Double or triple periodization	No periodization
Technical Skills	N/A	Aquatics and ball sport fundamental skills Swim skills Kicking skills Introduction to basic ball control skills	Learning and development of water polo specific body movement skills Refine swim and kicking skills Change in body position Refine and improve ball control skills Basic goaltending skills	Maintenance and improvement of all skills	Skill perfection and situational adaptation	Skill perfection and situational adaptation	Skill perfection and situational adaptation	Maintenance and improvement of all skills
				Development of secondary skills	Specialization of position			Development of secondary skills
				Development of positional skills	Refinement of positional skill set			
Tactical and Game Strategies Skills	N/A	N/A	Basic water polo decision making skills Learn and play all positions	Introduction and development of base tactical skills 1 on 1 tactics	Introduction and development of advanced tactical skills Solutions to a wide variety of defences	Refinement and perfection of advanced tactical skills Increase sophistication of performance analysis	Refinement and perfection of advanced tactical skills Increase sophistication of performance analysis	Basic water polo decision making skills Introduction and development of base tactical skills
				Understanding of all positions (general ability to play anywhere in the pool)	Introduction to individual and team performance analysis	Scouting to exploit your team strengths and opponents weaknesses	Scouting to exploit your team strengths and opponents weaknesses	Introduction and development of base tactical skills
				Applied decision making (creativity)	Continue to emphasize creativity			Understanding of all positions (general ability to play anywhere in the pool)
Optimal Practice to Game Ratio	N/A	70:30	60:40	50:50	40:60	30:70	25:75	20:80

Supplementary Knowledge	N/A	Development of social skills: cooperation; working within a team; following directions; self-control; group interaction; and listening skills Introduction to simple safety guidelines Introduction to fair play philosophy Introduction to simple safety guidelines	Enhancement of social skills Understanding and adherence to fair play Simple work ethic and commitment expectations Introduction to ancillary capacities Injury prevention and management	Development of ancillary capacities Adherence of fair play Understanding of the benefits of sport specific training Injury prevention and management	Understanding the added value of the ancillary capacities Development of weightlifting techniques Knowledge of competition structures and programs Development of performance analysis	Understanding the added value of the ancillary capacities Refine mental training skills Consolidate recovery and regeneration skills Communication skills with media, sponsors, and VIPs	Understanding the added value of the ancillary capacities Refine mental training skills Consolidate recovery and regeneration skills Communication skills with media, sponsors, and VIPs	Development and understanding of ancillary capacities Adherence of fair play Injury prevention and management Education on healthy eating habits Education on coaching, official, and administrative/ volunteering opportunities
Coaches Certification	N/A	Community Sport-Initiation	Community Sport-Initiation	Community Sport-Initiation Competition - Introduction Competition - Introduction Advanced Gradation	Competition - Introduction Competition -Introduction Advanced Gradation	Competition - Introduction Advanced Gradation	Competition- High-Performance	Community Sport-Initiation or Competition-Introduction
Referee Certification	N/A	N/A	Community Sport Initiation	Community Sport Initiation Regional Provincial	Regional Provincial Provincial National C National C National B	National C National B National A National A UANA FINA FINA-R	UANA FINA FINA-R	Community Sport Initiation Regional Provincial
Facilities	Any water basin	Any pool 1-2 metres deep	20-25 metres all deep or combination shallow-deep	25 metres all deep	25-30 metres all deep	25-30 metres all deep	25-30 metres all deep	20-25 metres all deep or combination shallow-deep

Legend (streams of competition):
Physical Literacy
Active for Life Stream and Pathway
Competitive Stream
Excellence Stream

An athlete can move in and out of a stream of competition at any point in the Competitive Foundations and Training to Compete pathways.
At the Training to Perform pathway, the Active for Life stream of competition is eliminated, and a recreational athlete will be part of the Active for Life pathway. Living to Win is strictly for the Excellence stream of competitive athletes (i.e. National Team athletes).



© Sport Canada and Water Polo Canada 2010