

USA Hockey Model Long-Term Athlete Development Stages



FUNDamentals Late Childhood M 6-9 years F 6-8 years 8 and Under Mites	The objective of the FUNdametals stage is to learn all fundamental movement skills and build overall motor skills. This phase of growth and development is characterized by rapid growth. Generally larger muscle groups are better developed which makes it easier for players to perform 'large' movements rather than precise coordinated movements involving the interaction of many smaller muscles. Consequently the emphasis should be on developing basic movement skills in a fun way – the FUNdamentals: ABCs: Agility, Balance, Coordination, Speed KGBs: Kinesthetics, Gliding, Buoyancy RJTs: Running, Jumping, Throwing CPKs: Catching, Passing, Kicking, Striking Young people should be encouraged to learn simple sports skills, including striking skills to develop hand-eye coordination and gliding skills to improve balance and coordination. Activities and games should emphasize coordination and learning through repeating movement, but as attention spans are short, variety and structure are essential. As there is little difference developmentally between girls and boys at this stage, mixed activities are encouraged. Participation in a variety of activities and sports helps to develop basic movement skills, and endurance can be developed through playing fun games and activities. Young people are more suited to longer bursts of low intensity activity at this stage of their development, rather than short bursts of high intensity activity. The emphasis must always be on FUN rather than winning. The first window of accelerated adaptation to speed occurs at ages 6 to 8 for girls and 7 to 9 for boys. Bypassing the specialized skill development in the FUNdamentals stage is detrimental to the child's future engagement in physical activity and sport.
Learning to Train Early Puberty M 9-12 years F 8-11 years 10 and Under Squirts 12 and Under Peewee	Speed, agility and coordination are still improving rapidly during this phase. With this improvement of fine motor movement all core skills can be introduced and mastered. This is the key phase for learning good technique, and so quality training, including applying skills in game scenarios, should take precedence over competition results. This is reflected by an emphasis of 70% training, 10% competition specific training¹ and 20% competition². Research shows that failing to utilize this period of growth for skill development will mean that a player is unlikely to reach his or her full potential. Players should learn how to train during this phase, and be encouraged to understand the need to develop fitness, hockey skills and tactical awareness in all playing positions. Players will be developing the mental capabilities to enable decision making in more complex game situations. Participation in complementary sports will enhance players' learning and understanding of skills and decision making in games. Young people are still more suited to longer bursts of low intensity activity at this phase of their development, but will also be undergoing growth spurts that will affect coordination. Once their body has adapted, skills may need to be re-learned or refined as a result of these changes in relative limb lengths. Players will be developing physically and mentally at different rates so chronological age (i.e. from birth date) may not be the most appropriate way to group players. As much as possible, players should be given individual specific direction and structure within their training to recognize that development is occurring at different rates for each player. Evaluators should avoid choosing early physical developers simply because they are stronger or faster – a rounded view of players' long-term potential should be encouraged.

¹ Competition specific training is scrimmaging, exhibition games, etc.

² Competition is sanctioned competition, league play, tournaments, playoffs, etc.

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Training to Train Late Puberty M 12-16 years F 11-15 years 14 and Under Bantam 16 and Under Midget	Research shows that this phase of development is key for the development of various aspects of fitness. Toward the end of this phase, young players will be better able to deal with the demands of short bursts of higher intensity activity required for hockey. The latter end of this phase of development is the ideal time for developing speed and strength using body weight exercises, but this should be part of a program tailored to the individual due to differing rates of growth and maturation. The emphasis should remain on training during this phase, reflected in a ratio of 60% training, 20% competition specific training and 20% competition. This is also a prime skill development period, but due to better developed mental capacities, players will be more able to train under realistic game pressure, applying core skills to develop decision-making ability in a variety of playing positions. Competition should be used only to reinforce learning and refine the application of skills, not concentrate on the games outcome. Young players should ideally undertake competition only with peer groups at this delicate period of their development. As with the previous phase of development, research shows the need for physical (fitness) preparation and skill development is critical here. This will result in an increase in the training demands on young players. However, for hockey training sessions should be structured to perform the dual function of working on aspects of fitness alongside skills. Additionally, the recommendations should be viewed as a weekly 'program' that may be obtained via a number of different sources, e.g. school PE, club or other hockey coaching, and participation in complementary sports, which is still to be encouraged at this stage. It is for this reason that efforts should be made to manage individual players' sporting, academic and social commitments in order to achieve balance. This is particularly important for talented players who may be accessing coaching via a number of different sources, potentially in more than one sport. This is the stage at which the draft LTAD hockey model differentiates its content to provide guidance for all those who play hockey (standard content) and those who aspire to become elite performers (high performance content). It is recognized that at these ages there is still very little difference in recommended content as this is such an important age and many players still possess the potential to become elite performers.
Learn to Compete Early Adult M 16-18 years F 15-17 years 18 and Under Midget	This is also an important phase for fitness development, particularly for strength. The content is intended to reflect the degree of commitment required to continue a players' development either as a recreational or an aspiring elite player. The development of skills and mental capabilities will be well advanced in players at these age groups so it is appropriate for more emphasis to be placed on competition, demonstrated by a 50% training, 25% competition specific training and 25% competition ratio. In the early part of this phase, the emphasis within competition should still be to reinforce learning, with a gradual shift to a more outcome drive emphasis. A players' ability to perform core skills and make decisions within a game situation have reached a standard at which tactical strategies can be properly applied in order to try to overcome opposing teams, at these age levels. Training will include more specific preparation for competition.

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Training to Compete Early Adult M 19-23 years F 18-21 years Junior, NCAA	Fitness development is a specific component of the train-to-compete phase. As the body reaches mature status, all physical systems are ready to train for optimal performance, and strength development can begin to produce optimal body mass. The content is intended to reflect the degree of commitment required for the aspiring elite-level player. The development of skills and mental capabilities will be well advanced and so it is appropriate for more emphasis to be placed on competition, demonstrated by a proposed 40% training, 30% sports specific training and 30% competition ratio. The emphasis within competition should be much more outcome driven. This is because a player's ability to perform core skills and make decisions within a game situation have reached a standard at which tactical strategies can be properly applied in order to try to overcome opposing teams. Training will include more specific preparation for competition.
Training to Win Adulthood M 19+ years F 18+ years NCAA, NHL	This is the final stage of athletic preparation. Skill and tactical preparation will be tailored for competitions, with ratios reaching 40% training, 20% competition specific training and 40% competition. With all skill and tactical abilities fully developed, emphasis can now be placed on achieving the best possible performance in competition.

USA HOCKEY

LONG-TERM ATHLETE DEVELOPMENT MODEL

Draft of LTAD for Ice Hockey – Standard and High Performance Tracks



Stages of Development	Ages	Objectives for Development				Training Characterized by	Other Issues (including competition)
		Physiological	Hockey Specific	Psychological	Lifestyle		
FUNDamentals Learning FUNDamental movement skills	M 6-9 yrs F 6-8 yrs 8 and Under Mites 6 and Under Mites Learn to Play	- Basic movement skills: Agility, balance & coordination - Some basic sports skills: Running, jumping, skating, throwing, striking - Development of speed - Introductions to core stability - Principles of warm-up & cool down - Daily physical activity	- Emphasis on fun - Introduction to simple sports skills through hockey and other sports, especially speed, quickness and agility as well as striking skills to promote hand-eye coordination - use of structured programs	- Ensure motor learning issues are adopted into coaching practice - Introduction to ethics and rules	- Introduce the basics of: good cultural and lifestyle habits, nutrition, hydration, recovery - Sportsmanship - Begin parent education about these issues	- Emphasis on fun - Encourage daily activity (formal and informal) - Encourage participation in many different sports - 2X hockey p/w - Session Length 50 mins. - No periodization	- No formal competition - Encourage game play experience in a variety of sports, emphasis on learning - Some cross ice game play weekly
Learn to Train Learning FUNDamental sport skills	M 9-12 yrs F 8-11 yrs 12 and Under Peeewe 10 and Under Squirt	- Basic sports skills: Jumping, skating striking - Develop speed through agility, speed & change of direction in warm-up - Introduce flexibility & exercises for strength development - Develop endurance through activity - Generic lower body and core stability	- Peak skill emphasis - Development of hockey core skills - Introduction to applying core skills in decision making situations - Basic assessment for talent identification at 12 and Under Peeewe	- Ensure motor learning issues are adopted into coaching practice - Developing basic knowledge and experience in small area game play - Applying core skills in basic hockey decision making situations - Reinforcement of ethics and rules - Introduction to mental preparation	- As above - Introduce principles of tapering and peaking - Continue parental education on these issues	- Encourage daily activity (formal and informal) - Structured to enhance learning of basic sports skills, in multiple sport environment - participate in 2-3 complementary sports - 3-4X hockey p/w - Session length 60 mins. - Double periodization to aid structuring and maintain interest	- Ratio of 70% training, 10% competition specific training, and 20% competition - Informal competition to encourage application of techniques in game play - Overall activity ratios: 30% hockey 30% fitness through sport 40% other sports
Train to Train Building fitness and sport specific skills	M 12-16 yrs F 11-15 yrs 16 and Under Midget 14 and Under Bantam	Standard Content - Major fitness development phase for: Endurance (at major growth spurt) - Strength (at major growth spurt +18 months) - Speed (M 13-16) (F 11-13) - Continued lower body and core stability development	- Critical sports specific skills development phase - Training reflects more realistic game pressures for application of core skills to develop decision making - Competition used to reinforce learning and refining of technique, not performance. (process driven not outcome driven) - Continued assessment for selection	- Motor issues continue to be adopted in coaching practice - Players exposed to more complex decision making situations - Continuing education on mental preparation - Developing appropriate attitudes to competition e.g. 'being the best you can be' not 'winning at all costs'	- Develop understanding of good cultural and lifestyle habits, nutrition, hydration and recovery - Introduction of individual management - Parental education and involvement in lifestyle management	- Begin fitness training to coincide with major growth spurt 2-3 X speed, lat/linear 2 X strength - Participation in 1-2 complementary sports - 3-4X hockey p/w - Session length 60-80 mins. - Single or double periodization	- Ratio of 60% training, 20% competition specific training, and 20% competition - Competition used to reinforce learning, (process not outcome driven) - Overall activity ratios: 45% hockey 35% fitness 20% other sports

Developed on the work of Istvan Balyi, an internationally recognized coach educator, and is based on a consensus of evidenced research about how young people develop sports abilities, linking more closely coaching and athletes' physical and psychological growth.

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LONG-TERM ATHLETE DEVELOPMENT MODEL – Standard and High Performance Tracks



Stages of Development	Ages	Objectives for Development				Training Characterized by	Other Issues (including competition)
		Physiological	Hockey Specific	Psychological	Lifestyle		
Train to Train Building fitness and sport specific skills	M 12-16 yrs F 11-15 yrs	High Performance Content - Major fitness development phase for: Endurance (at major growth spurt) Strength (at major growth spurt +18 months) Speed (M 13-16) (F 11-13) Continued lower body and core stability development	- Critical sports specific skills development phase - Training reflects more realistic game pressures for application of core skills to develop decision making - Competition used to reinforce learning and refining of technique, not performance (process not outcome) - Continued assessment for selection – (U17 NTDP and Select Teams)	- Motor issues continue to be adopted in coaching practice - Players exposed to more complex decision making situations - Continuing education on mental preparation - Develop appropriate attitudes to competition aims e.g. 'being the best you can be' not 'winning at all costs'	- Develop understanding of good cultural and lifestyle habits, nutrition, hydration and recovery, tapering and peaking - Introduction of individual management - Parental education and involvement in lifestyle management	- Begin fitness training to coincide with major growth spurt 2-3 X speed, lat/linear 2 X strength - Participation in 1-2 complementary sports - 4-5X hockey p/w - Session length 60-80 mins. Single or double periodization	- Ratio of 60% training, 20% competition specific training, and 20% competition - Competition used to reinforce learning, (process, not outcome driven) Overall activity ratios: 45% hockey 45% fitness 10% other sports
	16 and Under Midget 14 and Under Bantam						
Learn to Compete Refining skills for particular events and competitions	M 16-18 yrs F 15-18 yrs	Standard Content - Major fitness development stage for strength - Fitness and recovery program tailored to individual - Knee stability - Hockey specific core stability maintenance	- Maintain training in many different positions to avoid specialization (except goalies) - Model training and competition needs to account for periodization - Preparation under competitive conditions - Emphasis on technical and tactical preparation, event and position specific as required - Continued evaluation and selection	- Refine decision making abilities in game situations - Continued development of mental preparation skills	- Continue education on lifestyle issues - Encourage use of individual management to balance demands	- 3 x 30 min fitness through physical activity - 2-3X hockey p/w - Session length 60-90 min - Participate in 1 complementary sport	- Ratio of 50% training to 25% competition specific training, and 25% competition - Competition used to reinforce learning but becoming more outcome driven - Overall activity ratios: 50% hockey 40% fitness 10% other sports
	18 and Under Midget	High Performance Content - Same as standard content but frequency and intensity adjusted for high performance athletes - Fitness and recovery program tailored to individual athlete - Core stability appropriate to needs of athlete - Include active recovery determined by individual diagnostics	- Same as standard content but frequency and intensity adjusted for high performance athletes - Continued evaluation and selection	- Refine decision making abilities in game situations - Continue development of advanced mental preparation skills for competitive environment - Develop appropriate attitudes to competition, becoming more outcome focused	- Monitor and optimize understanding of performance lifestyles, nutrition, hydration recovery, tapering and peaking - Use of individual management to balance demands - Continued parental education and involvement in lifestyle management	- Fitness training to account for strength development phase - 4-6 fitness sessions p/w - 5-6 hockey sessions p/w - Session length 60-90 min - Participate in 1 complementary sport - Double or triple periodization	- Ratio of 50% training, 25% competition specific training, and 25% competition - Competition used to reinforce learning but becoming more outcome driven - Overall activity ratios: 60% hockey 40% fitness

Periodization - Refers to the division of a calendar year into specific phases of preparation, competition and rest. During the preparation phase, the emphasis is on training in readiness for competition. A double periodization calendar year would have two cycles of these phases, i.e. preparation-competition-rest- preparation-competition-rest.

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Stages of Development	Ages	Objectives for Development				Training Characterized by	Other Issues (including competition)
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Train to Compete Refining skills for particular events and competitions	M 19-23 yrs F 19-21 yrs Junior, NCAA	High Performance Content - Major fitness development stage for strength - Fitness and recovery program tailored to individual - Knee stability - Fitness and recovery program tailored to individual athlete - Core stability appropriate to needs of athlete - Include active recovery determined by individual diagnostics	- Model training and competition needs to account for periodization - Preparation under competitive conditions - Emphasis on technical and tactical preparation, event and position specific as required - Same as standard content but frequency and intensity adjusted for high performance athletes - Continued evaluation and selection	- Refine decision making abilities in game situations - Continue development of advanced mental preparation skills for competitive environment - Develop appropriate attitudes to competition, becoming more outcome focused	- Monitor and optimize understanding of performance lifestyles, nutrition, hydration recovery, tapering and peaking - Use individual management to balance demands - Continue education in lifestyle management	- Fitness training to account for strength development phase - 4-6 fitness sessions p/w - 5-6 hockey sessions p/w - Session length 60-90 min - Double or triple periodization	- Ratio of 40% training, 30% competition specific training, and 30% competition - Competition used to reinforce learning but much greater emphasis placed on competition outcome - Overall activity ratios: 60% hockey 40% fitness
	M 19+ yrs F 18+ yrs Junior, NCAA, NHL	High Performance Content - High Intensity, high volume training - Continued speed, strength and endurance development - Training tailored for individual peak performance - Physical preparation tailored to peak for major competitions - Frequent breaks in program for recovery - Daily recovery program	- Program tailored to needs of individual athlete - Continued development of technical and tactical skills - Technical and tactical preparation tailored to peak for major competitions - Ongoing assessment and selection	- Program tailored to needs of individual athlete - Advanced mental preparation modeled to account for periodization	- Monitored high performance lifestyle - Individual management program	- 4-6 fitness sessions p/w - 6-8 hockey sessions p/w - Session length 60-90 min - Double or triple periodization	- Ratio of 30% training, 20% competition specific training, and 50% competition - Competition becomes outcome driven - Overall activity ratios: 65% hockey 35% fitness

Developed on the work of Istvan Balyi, an internationally recognized coach educator, and based on a consensus of evidenced research about how young people develop sports abilities, linking more closely coaching and athletes' physical and psychological growth.

How to Measure Peak Height Velocity (PHV)?¹

What is PHV?

PHV is directly linked to the Development Age of athletes. PHV is a measure of the maximum rate of growth in stature during a growth spurt. The age of maximum velocity of growth is called the age at PHV.

As many of you know, PHV is a key component of the Long Term Athlete Development (LTAD) principles.

Why is it important to know when PHV occurs?

Each athlete grows at a different rate; therefore a coach can have, on the same team or training group, early, average and/or late maturers.

All coaches should be monitoring PHV in order to adapt training accordingly. PHV in girls occurs at about 12 years of age. Usually the first physical sign of adolescence is breast budding, which occurs slightly after the onset of the growth spurt. Shortly thereafter, pubic hair begins to grow. Menarche, or the onset of menstruation, comes rather late in the growth spurt, occurring after PHV is achieved. The sequences of developmental events normally occur 2 or more years earlier or later than average.

How to monitor PHV?

Due to seasonal variations and for consistency purposes, experts are recommending that all measurements are taken in the morning at a consistent time. (measures are more reliable after a rest day).

STEP 1:

As soon as the athlete turns 6 years of age, the coach should be measuring height every three months.

STEP 2:

Produce a chart with height on the vertical axis and age on the horizontal axis.

STEP 3:

As soon as the coach notices a small deceleration in growth followed by acceleration in growth, the coach should start to measure the arm span as well as the height of the athlete. Measurements of torso length should be done while the athlete is sitting on the floor next to a wall with bent knees (90 degrees). The average age for girls in this period of development is 10 years.

STEP 4:

Similar Charts to the above should be developed to display all three measurements. Consistent acceleration in growth should be noticed at this time. **The athletes' training has to be adapted according to the windows of trainability.**

STEP 5:

PHV is the highest point of growth acceleration. After PHV is attained, a deceleration in growth will happen. Continue to monitor growth for 12 to 18 months after PHV. **The athletes' training has to be adapted according to the windows of trainability.** Please refer to the figures below for details on the curve and how the chart should be constructed.

How long is the growth spurt?

¹ References : Canadian Sport for Life published by Canada Sport Centres (Sport Canada);
Notes from Sport Canada Workshop – **How to measure PHV?** (Istvan Balyi)
Notes from Sheilagh Croxon and Charles Cardinal

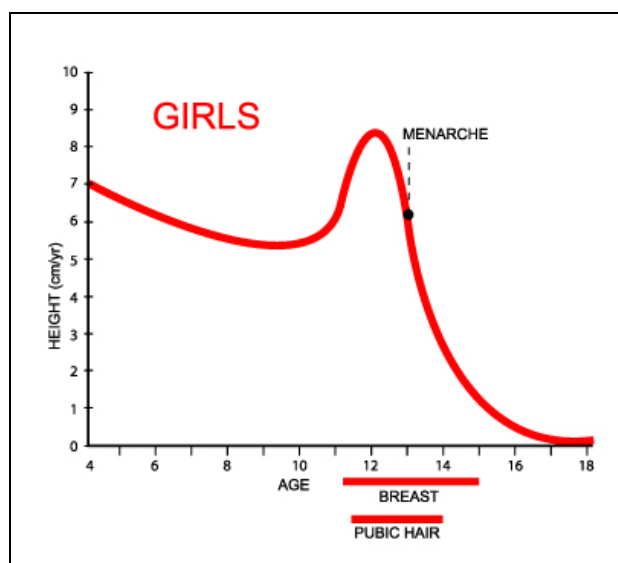
The growth spurt can last anywhere from 1.5 years (for fast developers) to 5 years (for slow developers). Typically a girl grows on average 6cm in the first year of her growth spurt, 8cm in the second year, and 6cm in the third year.

What are the windows of trainability?

The windows of trainability (accelerated adaptation to training) for 2 of the 5's are related to PHV so it is important to monitor it so these windows can be maximized.

1. Strength – there are 2 critical windows of accelerated adaptation to strength training:
1 – immediately following PHV and 2 – at the onset of menarche.
2. Stamina – the critical window of accelerated adaptation to aerobic training begins with the onset of PHV which is on average 10-11 years old in girls.

Maturity Events in Girls (Modified after Ross et al.1977)



Pacific Sport - Optimal Windows of Trainability (Balyi and Way, 2005)

