

# PHYSICAL QUALITIES

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***Fundamental Movement Skills, Sport Specific Skills, mobility, agility, speed, power, strength, hypertrophy, endurance & metabolic conditioning are physical qualities. These physical qualities can be developed throughout a players' [humans] lifetime. They are best developed through participation in structured and unstructured training, free play, and participation in different sports.***

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Coaches should focus on own body weight exercises with children and clean technical execution of the exercises this will support the development of other Fundamental Movement Skills (FMS). Strength training has positive effects on the physical development of children and adolescents as well as on their general motoric development.

The Youth Physical Development Model as shown in the table below, is based on the models presented by Kite and Bailey (2017). The development of physical qualities supports the long-term development of all youth participating in sports and physical activities. The model combines chronological age, age periods, growth rate, maturational status, training adaptation, physical qualities, talent development, psycho-social development and training structure in one to inform and guide coaches, as well as parents and others involved in the developmental path from childhood to adulthood to focus on creating the best possible development environment.

The combined model shows that all physical qualities are trainable during all maturational stages of children and adolescents but that the adaptation is dependent on the maturational status.

The model states that strength development is the most important physical quality in the training of children and youth, for females and males.

The larger the font size used in the model, the more emphasize should be put on developing that particular physical quality at that developmental stage.

In early childhood and middle childhood emphasize should be put on developing Fundamental Movement skills (FMS) and strength, this will build a foundation for the development of the other physical qualities.

During adolescents and towards adulthood training should emphasize the development of agility, speed, power, strength and hypertrophy.

***FMS should be a part of every stage of a players development.***

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### YOUTH PHYSICAL DEVELOPMENT MODEL

Chronological Age	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21+				
Structure	Unstructured				Low				Moderate				High				V. High							
Talent Development	Investment Years					Sampling Years					Recreation or Specializing Years													
Psycho-Special Development	Exploration and Social Interaction				Peer Relationships, Empowerment, Self-esteem								Self Worth, Self Confidence or Sport Specific Psychological Skills											
Training Adaptation	Predominantly Neutral (Age-Related)										↔		Combination of Neutral and Hormonal (Maturity-Related)											
Growth Rate	Rapid				↔		Steady				↔		Adolescent Spurt				↔				Decline			
	Early Childhood				Middle Childhood					Adolescence							Adulthood							
Male Qualities	FMS	█				█					█							█						
	SSS*	█				█					█							█						
	Mobility	█				█					█							█						
	Agility	█				█					█							█						
	Speed	█				█					█							█						
	Power	█				█					█							█						
	Strength	█				█					█							█						
	Hypertrophy	█				█					█							█						
	Endurance	█				█					█							█						
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21+				
	Early Childhood				Middle Childhood					Adolescence							Adulthood							
Female Qualities	FMS	█				█					█							█						
	SSS*	█				█					█							█						
	Mobility	█				█					█							█						
	Agility	█				█					█							█						
	Speed	█				█					█							█						
	Power	█				█					█							█						
	Strength	█				█					█							█						
	Hypertrophy	█				█					█							█						
	Endurance	█				█					█							█						

\*Sport Specific Skills

## STRENGTH TRAINING

As shown in the model, strength is a quality that should be developed all the time throughout the development, growth and maturation of males and females. Physical training and strength development does not hinder or negatively affect growth or maturation of children; on the other hand, it supports growth and maturation and is especially beneficial for girls to prevent osteoporosis later in life. Weight-bearing strength training exercises generate compressive forces, which support bone formation and growth.

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Developing strength is an important aspect during the physical development of boys and girls starting from birth. Strength supports positively the development of speed, power, agility, plyometrics and endurance, as well as the development of Fundamental Movement Skills such as running, jumping, balance and coordination, and is an important aspect in injury prevention. Strength is developed through the application of resistance training in the beginner stage through bodyweight exercises and in later stages through resistance-training programmes using free weights and machines. Free-weight resistance training programmes should be planned and supervised by certified strength and conditioning specialists when possible. During programme design the development stage of each individual player needs to be taken into consideration. Proper progression and program variation will optimize gains, prevent boredom, as well as reduce the potential for overtraining.

### FUNDAMENTAL MOVEMENT SKILLS

Fundamental Movement Skills are an important building block in player development on the way to developing physical literacy. Players who have well-developed FMS are more likely to continue to participate in ice hockey, will be more adapt to engage and enjoy the sport, and possess a well-developed base on which to develop sport-specific skills and complex movement patterns. Furthermore, will a well-developed FMS base support injury-prevention.

### SPEED DEVELOPMENT

Speed development is part of a well-designed training program for players in the middle childhood and adolescent phase. In the middle childhood phase, players will develop speed due to neural activation through plyometrics and short sprint bouts of maximum 10s. In the adolescent phase, players will develop speed through the execution of plyometrics and exercises to develop leg strength, which targets both, neural and structural development.

### AGILITY DEVELOPMENT

Agility is a systematically developed skill, which is learned and developed over a long-period of time through correct use and application of a training programme, which is based and planned on the developmental stage of the player. Agility performance by a player is based on the players ability to use the equipment, pay attention, the problem solving skills, gaze control, strength and power capacity, motor pattern quality (neural mechanisms), and environmental factors such as the playing surface and the location of the team-mates. Agility is a combination of physical qualities and cognitive functions (mental, perception). The physical qualities of agility are: speed, strength, power and technique. The cognitive functions are: perceptual factors and decision-making process.

Agility can be defined as the ability to read a certain situation during e.g. the game, and to react appropriately to it. In order to train agility appropriately the coach has to determine the requirements of the game and based on these, plans the agility programme, which needs to ensure a high practice to game application transfer.

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During early and middle childhood the neuromuscular system develops rapidly, due to active brain development (synaptic pruning), during this period players will develop and adapt fast to changing environments and stimuli and will develop a broad movement base for their future within a chosen sport.

The cognitive functions play a key role in the determination and application of the correct playing and movement strategies for a given sport situation.

### **MOBILITY AND FLEXIBILITY**

Flexibility and mobility training should be part of the training programme during the Beginner stage (Start phase) of a player and should stay part of the regular training programme, also in the later stages. Well-developed mobility gives the player the ability to perform required sport movements freely. Mobility includes components of strength, power, flexibility and body control. Flexibility is usually defined as the ability of muscles (the body's soft tissue) to stretch.

### **HYPERTOPHY**

Training for hypertrophy can become part of the training programme for players when they have reached the end of their adolescent/pubertal growth spurt, when the body starts to produce an adequate amount of testosterone and growth hormones. Hypertrophy training will increase muscular strength and overall performance but should only be a part of a well-designed and personalized strength-training programme. Hypertrophy is the increase of muscle size due to resistance training, which will lead to an increase in muscular strength.

### **POWER**

Power can already be trained during childhood but power training should be emphasized during adolescents and adulthood when the maturational process is advanced and increases in power output are due to neural and hormonal adaptations.

It is recommended to include some muscular power training also during early and middle childhood but the main emphasize of power training for players should be during adolescents and adulthood. Power is defined as the ability of a player to exert force at high speed. For example a player needs leg power on the ice to forcefully push the skate against the ice to move quickly towards the puck; or power in the upper body and arms to exert a high amount of force with high speed during a slap shot.