



## **IMMDA ADVISORY STATEMENT ON CHILDREN AND MARATHONING: HOW YOUNG IS TOO YOUNG?**

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### **ADVISORY STATEMENT:**

*Marathon running should be reserved only for those individuals who have reached their eighteenth birthday.*

### **Introduction**

Over the past dozen years, the world has witnessed, with accelerated speed, the erosion of children experiencing and enjoying childhood and adolescence. There has been a drive to have children grow up quickly and become immersed in the adult world - where they will spend the vast majority of their years. This is done in virtually every

phase of their young lives, often by caring parents and communities, without a true understanding of the developmental and emotional needs of childhood and adolescence.

Justification for such thinking comes from the notion that "Life is competitive, life is 'a race'. We must start early on that path to ultimate success." Examples of such misconceptions, myths and inappropriate expectations begin almost from birth, progress through infancy and early childhood, and culminate in adolescence. They are seen in areas of learning, eating and physical activity. And so it is with the notion that running a marathon race of 26.2 miles is a sensible and appropriate activity for those youngsters less than eighteen years of age.

Children are not small adults. Their anatomy and physiology are developing and not fully mature. Despite these concepts which are intuitively understood in the broadest sense, in practice, and especially in athletic pursuits, these distinctions are forgotten or ignored.

The focus of discussion for some may be exclusively about whether participating in marathon events is detrimental physically to participants. This statement, however, will review the medical literature also in regard to whether there are emotional and developmental issues which should also play a major role in determining the policy regarding young athletes running in full length marathons.

## **Background**

The American Academy of Pediatrics Committee on Sports Medicine and Fitness has published various statements in recent years regarding reasonable guidelines for youth participation in physical activity. One such statement published by the

American Academy of Pediatrics (AAP) in May 2000 addresses the benefits of physical fitness and activity in schools (1). The key point of this statement is that positive health related behaviors acquired in childhood are more likely to be carried into adulthood (1,2,3). Thus, aerobic distance running for fitness as a child can clearly be beneficial to one's health as an adult (1,4). However, such fitness can be attained without ever approaching the rigors of training and distance covered in preparing for and running in marathons (5).

In another such statement in June 2001 titled "Organized Sports for Children and Preadolescents", the AAP committee outlines clear recommendations for childhood involvement in organized sports (6). The overall suggestion is to set reasonable goals for the child including acquire basic motor skills, increase physical activity levels, learn social skills to work as a team, learn good sportsmanship and have fun. One could contend that marathon participation could meet many of these goals. However, in this same statement, the AAP committee implies that sporting activity should be geared to meet the developmental level of children and adolescents in regard to their physical abilities, cognitive capacities, initiative and interest (6,7). This is not possible for a child marathoner. Emotional burnout is a real phenomenon that can have the exact opposite effect of that intended by participation. Children may develop feelings of failure and frustration when the demands, both physical and cognitive, exceed their internal resources.

Yet another statement published by the AAP in July 2000 addresses intensive training and sports specialization in young athletes (8). This statement warns against early specialization due to negative psychological effects. Most athletes report elite-

level competition to be a positive experience, but early specialization leads to less consistent performance, more injuries, and shortened sports careers than those who specialize after puberty (8, 9).

In their statement on *triathlon* participation by children in 1996, the AAP Committee on Sports Medicine and Fitness recognizes that children younger than 18 years require shorter distances of competition and specific guidelines to protect children from harm in competitions designed for adults (10). The AAP statement clearly delineates safety precautions to be followed in designing such a competition. Their recommendations state that triathlons for children and adolescents, like all other activities, should be specifically designed to meet their needs and provide "safety, fun and fitness rather than competition." The distances for each of the three events are significantly below those used by adults; further, there are distance categories for those aged 7 to 10; those aged 11 to 15, and those aged 15 to 19. The AAP statement outlines safety guidelines, including: tapering events in accordance with weather conditions, requiring a pre-event swim test, requiring an appropriate number of lifeguards for the swim, holding the swim in pools of appropriate temperature water rather than in open waters, closing off the bicycle course to motor vehicles, mandating bicycle helmet use, providing adequate fluids during and after competition, preparing to handle medical problems or emergencies, and screening all athletes prior to competition (10). These recommendations underscore the concept that it is appropriate and necessary to provide clear guidelines and modifications for participation by a child in an "adult" event.

A clear-cut physical barrier to marathon running in children is the decreased ability to withstand climatic heat stress by the exercising child or adolescent (11, 12, 13).

The data (enumerated in a 2000 AAP Sports Medicine and Fitness Committee statement) show that children do not adapt to heat stress as well as adults for several reasons. Children have a greater body surface area to body mass ratio than adults (11, 14); therefore, children gain more radiant heat on a hot day and lose more heat to the surrounding environment on a cool day compared to adults. Children also produce more metabolic heat per unit of body mass, and have a lower sweating capacity, resulting in a decreased ability to dissipate metabolic heat (12, 15, 16). A child takes longer to acclimatize to heat than the adult (11). Finally, the capacity to convey body heat by blood from the body core to the skin is reduced in the exercising child. Thus children are subject to a greater increase in core temperature during endurance activities than are adults.

### **Overuse Injuries**

Long distance running places high mechanical loads on the skeleton, both from ground reactive forces associated with gravity and muscle contractions. While walking, an individual is confronted with a ground reactive force equal to one's body weight. While running, however, these gravitational forces increase to between three and six times body weight, depending on whether one runs on flat surfaces or hilly terrain and also on the length of one's stride (especially when going downhill). A runner will land on each leg between 500 and 1000 times per mile, again depending on stride length.

The majority of injuries suffered by marathon runners are overuse injuries (17, 18, 19). It is well established that overuse injuries are of multi-factorial etiology, and many of these common risk factors for overuse injuries exist among both children and adults.

Risk factors unique to the growing child are numerous. It is well known that stress fractures, a distinct overuse injury, are a function of the number of repetitions and amount of applied force per repetition (17). Clearly, a child with shorter stride length subjects himself to more repetitions of impact to cover the same distance as an adult. Immature articular cartilage is more susceptible to shear force than adult cartilage and predisposes children to osteochondritis dissecans (20, 21). It has also been shown in studies by Stulber and Harris that injuries to the growth plate from repetitive trauma are possible etiologic factors in adult onset arthritis of the hip (20, 22, 23). Children are also prone to injury at apophyses such as the tibial tubercle, resulting in Osgood-Schlatter disease, and the calcaneus, resulting in Sever's disease (20, 24). A final characteristic of children that predisposes them to overuse injury is the asynchrony of bone growth and muscle-tendon elongation. During periods of rapid growth, bone growth occurs first with delayed muscle tendon elongation and resultant decreased flexibility (20, 25).

For the safety of young runners, it is imperative that the training program and its progression be followed closely and monitored carefully. From injury surveillance data conducted on high school athletes in Seattle over a fifteen year period, the activity with the highest rate of injuries was girls cross-country; this injury rate was statistically significantly higher than the other known "high risk sports" of football, wrestling and gymnastics (26, 27, 28, 29). Boys cross-country also had a surprisingly high rate of injuries, placing fifth overall (behind girls cross-country, football, wrestling and girls soccer). Distance running among adolescent boys and girls is thus associated with a relatively high rate of injury. For these athletes, the competitive distance is no more than 3 miles (27, 28, 29). Thus, training to run in a marathon, which is more than eight times

the usual cross-country competitive racing distance, is an inappropriate activity for young persons.

Newspaper articles about injuries in cross country running sprouted up after the Seattle high school injury surveillance study was publicized in the lay press (26). Several of these featured stories about injuries to young promising cross country runners, whose careers were cut short because of recurrent significant overuse injuries. Among orthopedic surgeons, some have expressed concern that athletes encouraged to do intensive running prior to skeletal maturity may be predisposed to degenerative diseases of the joints and cartilage as adults (30).

Thus among young athletes, preparing for a marathon is ill advised. In this population, more is not better; there is ample time to increase one's mileage and personal goals when athletes begin college competition at approximately age eighteen.

### **Psychological Considerations**

Many athletes involved in intensive athletic endeavors (which by its very nature marathon participation is) experience emotional burnout and loss of self-esteem, losing interest in the very activity that dominated their childhood and early adolescent years.

Much attention has been given to the issue of psychological effects of marathon running on child participants in the lay press. NBC Nightly News profiled a family during a summer 1988 broadcast (31), with five children (ages 6-16 years), all of whom participate in distance running, with training that includes running seven days per week. This family has been often used in the lay press in arguments for and against youth participation in marathons (32, 33). Reports of this family and other families claim that

the running regimen is the child's idea, and that each child truly enjoys this activity. Society, however, accepts the concept that below certain ages, a child is incapable of giving true consent. Heretofore, races have been "sanctioning" these activities by allowing children to compete in marathons, thus providing an avenue of encouragement for this behavior. The fact that marathon record times for children in age groups below 10 and between 10 and 13 exist only serve to fuel the desire to compete and better that record. Marathon running is a serious activity, one that is generally recognized as stressful to all who engage in it. Subjecting children to the stresses of marathon running and training is not healthful.

### **Female Athlete Triad**

Participation in certain sports predisposes female athletes to developing the female athlete triad (34). This triad consists of three interrelated conditions: disordered eating, amenorrhea, and osteoporosis, and is directly associated with intense athletic training (35, 36, 37). Sports which place athletes at higher risk of developing this condition include those in which: (a) thinness is emphasized, such as gymnastics, figure skating, diving, synchronized swimming and ballet; (b) those in which leanness is believed to improve performance, such as long distance running, swimming and cross country skiing; and (3) those in which weight classification exists, such as wrestling, martial arts and rowing (34). Marathon participation clearly is an activity which can lead to the female athlete triad.

### **Approaches of Other Organizations**

The sport of tennis confronted similar issues during the mid-1990s regarding the age at which athletes should be allowed to compete in tournaments. Such regulations were initiated because of the burnout problems of Jennifer Capriati and the impending rise of Venus and Serena Williams. The USATF limited the ages and number of tournaments the participants could engage in. The results have been quite positive. Jennifer Capriati personally shook off her "lost years" to return to championship form and the Williams sisters, forced to conform to restricted opportunities as children, are now the dominant forces in the women's tennis game today. The actions of the USATF were implemented after seeking expert medical opinions regarding the physical, mental and developmental nature of potential problems associated with unrestricted competition by young girls.

## **Conclusion**

Adults and parents are often called upon in our society to set limits and guidelines for precocious and demanding children. It is in the overall best interests of our children to make participation in a full marathon an adult activity, reserved only for those 18 years of age and above. Ample number of opportunities exist after eighteen years of age to participate in this exhilarating experience of marathon running.

While it is conceivable that given proper biomechanics and anatomy, a quality progressive training program, and appropriate maturity and cognitive level, a long distance runner can have a positive experience from participating in marathons prior to eighteen years of age. This special individual would be the exception and not the rule. Examples of such individuals do exist, but serve to demonstrate that decisions rendered

regarding participation are not designed with the "exception to the rule" as the critical parameter.

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- The International Marathon Medical Directors Association (IMMDA) was formed as the Consulting Medical Committee of the Association of International Marathons (AIMS). AIMS is a global organization of marathons and other road races, formed in May, 1982. The purpose of AIMS is to i) foster and promote marathon running throughout the world, ii) recognize and work with the International Association of Athletics Federations (IAAF) as the sport's world governing body on all matters relating to international marathons,*

*and iii) exchange information, knowledge, and expertise among its member events. AIMS' current roster numbers approximately 150 events which are conducted on all 7 continents and which includes the world's largest and most prestigious marathons.*

*The purpose of IMMUDA is to i) promote and study the health of long distance runners, ii) promote research into the cause and treatment of running injuries, iii) prevent the occurrence of injuries during mass participation runs, iv) offer guidelines for the provision of uniform marathon medical services throughout the world, and v) promote a close working relationship between race and medical directors in achieving the above four goals.*

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