



Sunrise to Sunset – Growth, Development & Maturation Issues in the Lifespan of the Wrestler

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To cite this article: David Curby (2013) Sunrise to Sunset – Growth, Development & Maturation Issues in the Lifespan of the Wrestler, International Journal of Wrestling Science, 3:2, 58-67, DOI: [10.1080/21615667.2013.10878989](https://doi.org/10.1080/21615667.2013.10878989)

To link to this article: <https://doi.org/10.1080/21615667.2013.10878989>



Published online: 15 Oct 2014.



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SUNRISE TO SUNSET – GROWTH, DEVELOPMENT & MATURATIONAL ISSUES IN THE LIFESPAN OF THE WRESTLER

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Scientists study data and look for relationships in order to make generalizations to explain behavior. We identify specific traits in groups of interest (often differences in means). We are not only interested in the mean, or averages, but also with the “outliers.” These are often the champions who perform far outside the norm. Scientists, coaches and other athletes look to these special people and attempt to mimic the traits that make these champions so special, and apart from the normal distribution.

The techniques, practices and behavior we use to achieve to one’s ultimate performance capacity is primarily through training, but also through a myriad of other influences from the environment, heredity and their interaction. These influences or factors both comprise and shape this capacity over the span of a lifetime. Additionally, the presence, or indeed absence, of these factors and influences at various points on the lifespan can dictate this performance capacity at a distant point in the future.

Allow me to schematically represent in Fig. 1 a hypothetical generalized wrestling performance capacity curve over the lifespan of a wrestler, along with the developmental and life stages. The level of performance needed for a world championship is shown above the generalized and normative performance capacity of most wrestlers. We know that the individual performance capacity curve of some rare wrestlers reach high enough to attain that golden status. It is also well known that there are some athletes who possess the necessary capacity, but never reach it! The work of the coach is to help the athlete reach their ideal performance capacity. If this is achieved, all should be satisfied and proud, regardless of the matches and medals won.

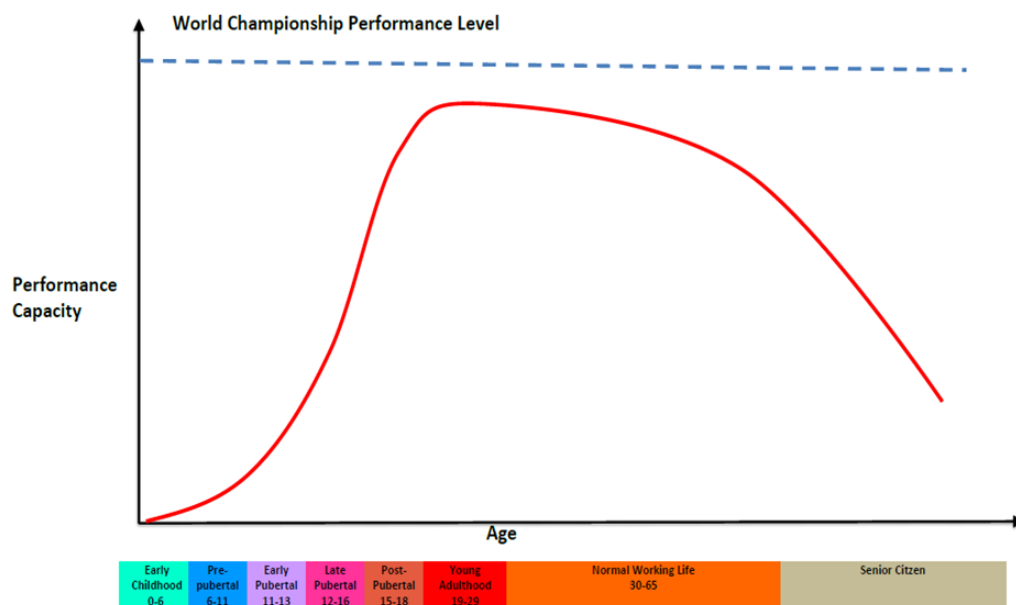


Fig. 1.
Hypothetical and
Generalized Wrestling
Performance Capacity
Curve Throughout a
Wrestler's Lifespan

There has been a recent movement to develop a training model for sport that has been termed Long-Term Athletic Development. It attempts to incorporate the developmental information that we know and apply it in a holistic manner. It is an athlete centered approach that is concerned with a maximization of potential throughout the lifespan of the athlete. Some of the leading contributors to this approach are Tudor Bompa (5) and Istvan Balyi(2). We have learned that what is done at one point on the timeline can have substantial effects, positive or negative, at a later point. This includes whether athletes reach their potential, and even whether a person stays with the sport.

Adopting this long-term perspective is crucial and will possibly lead us to the identification of solutions to some of the problems that we often see in modern sport. The focus for this article will, not be on the special training the

wrestler during times of maximal performance, but will examine the the periods on either side of peak championship performance, both very important if we are concerned with the “total wrestler,” or the “whole person.” It is athlete-centered in that it is designed to serve the best interests of each athlete’s long-term development, encouraging growth in skills and achievement while ensuring each individual remains engaged in sport.

I have been asked by USA Wrestling to be part of a project that will establish a core curriculum for the development of wrestlers from beginning wrestler, to standing atop the podium at the Olympic Games, and beyond. This paper will describe portions of the project.

The intent is to avoid some significant problems that we find within our current procedures. Among these are: 1) a high drop-out rate, 2) having many of our wrestlers coming to our national team lacking a broad physical and technical foundation, 3) not having a common training syllabus that is based upon known growth and maturational factors and 4) address the move to “normal life” after retirement from competition, as well as managing the long-term health effects in the entire lifespan of the wrestler.

The final goals include: assuring that we have a scientific basis for our programs; providing for individual differences of growing youth since individuals grow and mature at different rates and tempos; emphasizing the ultimate benefits of participation in wrestling and providing worthwhile goals for the entire spectrum of wrestlers and not just for the elite; by developing skills through participation in wrestling for the long-term (preventing “burn-out”); and to relieve the pressure on coaches and wrestlers to win immediately, but rather to reward commitment, effort, diligence, courage and determination without the undue physical and psychological pressures of inappropriate competition; and finally to provide necessary medical and career support.

This paper will highlight some key points of interest on the lifespan. The emphasis will not be on the actual organization of high level training during peak competitive years, but rather some important points that a holistic approach can provide for the best outcomes for our wrestlers. Let us begin with some important points on the timeline. **When do wrestlers reach their peak wrestling potential?** The indicator that is used is the mean age of when Olympic gold medals have been won (7). The analysis was done separately for the three disciplines in wrestling and are shown in figures 1 for Greco Roman, while men and women freestyle wrestlers have been combined in figure 2.

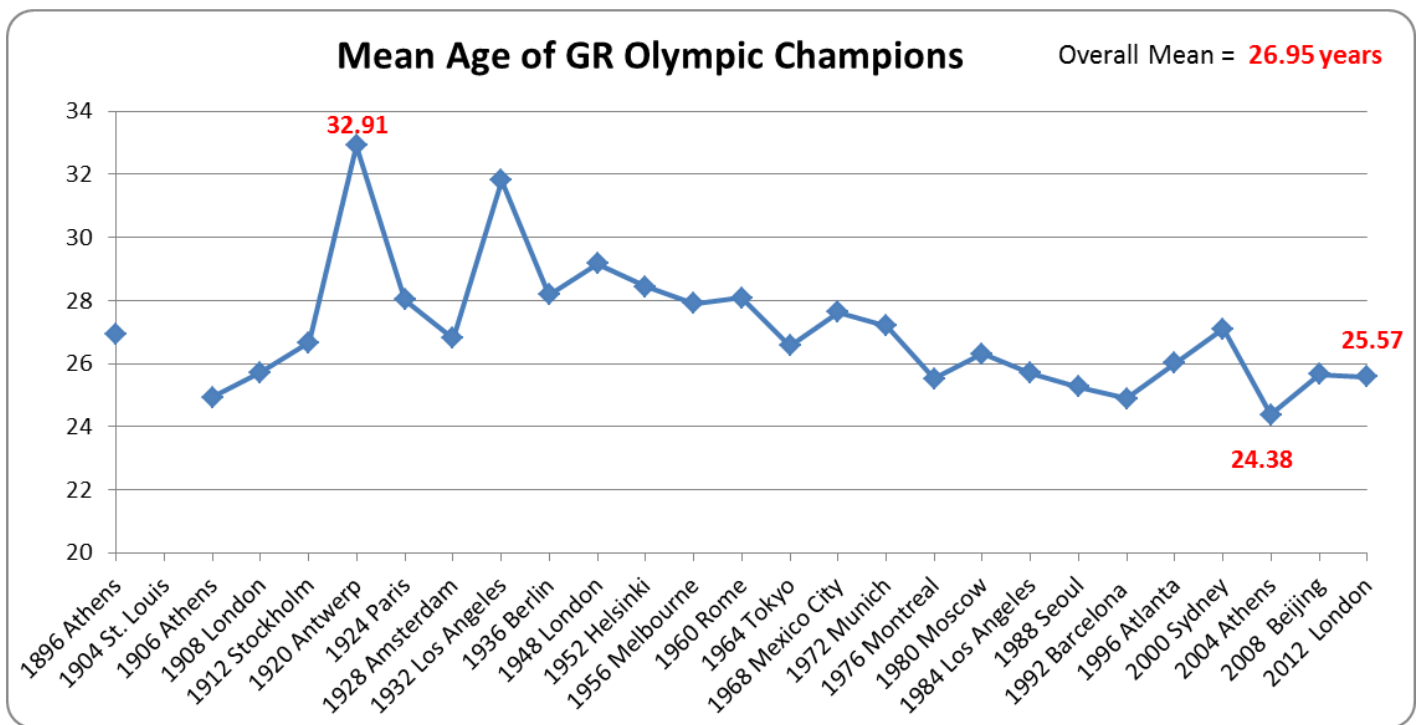


Fig. 1 Mean ages of Olympic champions in Greco Roman wrestling

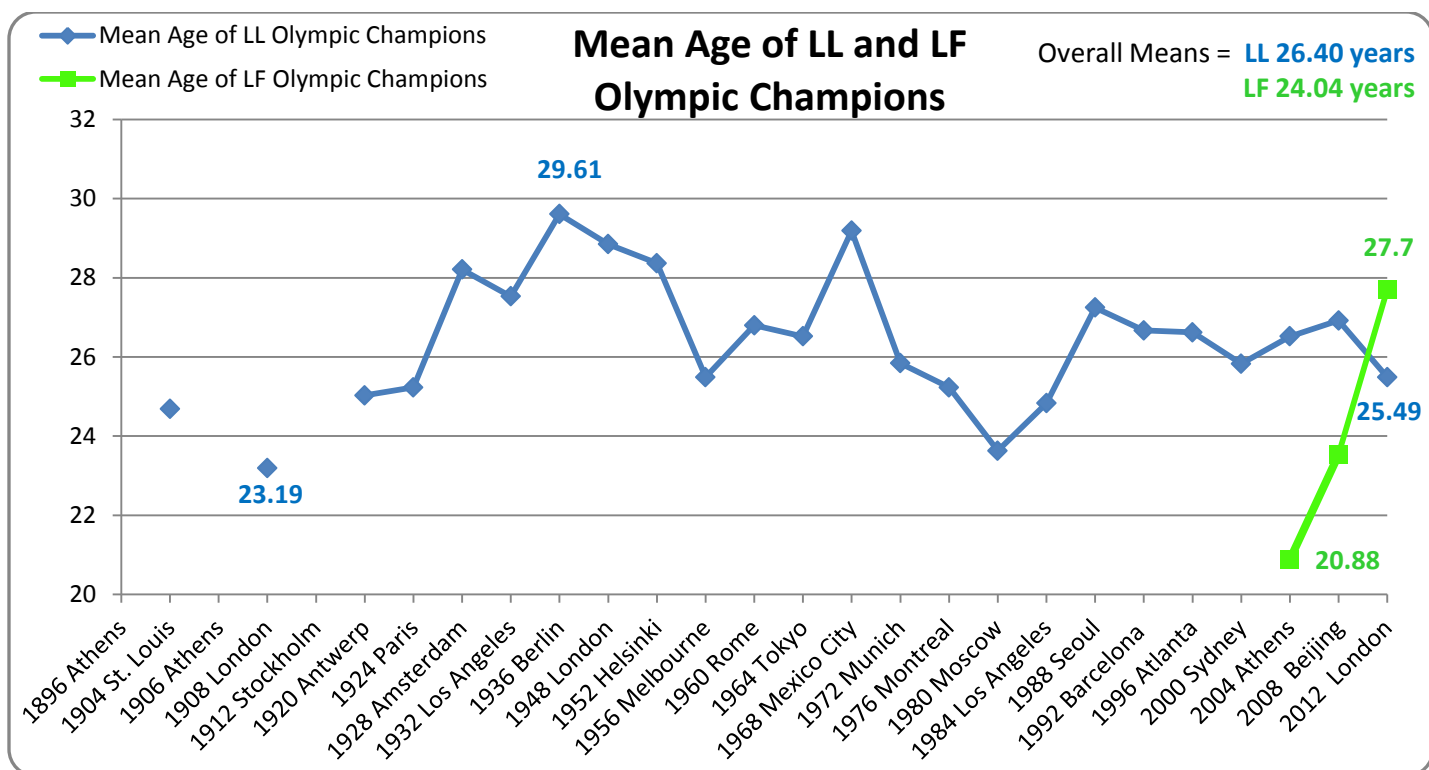


Fig. 2 Mean ages of Olympic champions in Men's and women's freestyle wrestling

The average age of all wrestling champions is 25.8 years. The freestyle average age is 26.42, Greco-Roman is 26.95 and the women's mean is 24.04 years. There is a slight downward trend for Greco Roman wrestlers since the first games. For the men in freestyle no trend seems to be present. The women have increased in age for each Olympiad. This is not a surprise, since two of the four weight classes were won by the same person each time. The champions at London were 27.15 and 25.83 for Greco-Roman and freestyle, respectively.

London Olympic Champions		
Freestyle (25.49)	Weight	Age
Otarsultanov, Dyamal S (RUS)	55 kg	25.32
Asgarov, Togrul (AZE)	60 kg	19.90
Yonemitsu, Tatsuhiro (JPN)	66 kg	26.01
Burroughs, Jordan (USA)	74 kg	24.01
Sharifov, Sharif (AZE)	84 kg	23.75
Varner Jake (USA)	96 kg	26.38
Taimazov, Artur (UZB)	120 kg	33.06
Greco Roman (25.39)		
Soryan, Hamid (IRI)	55 kg	26.95
Noroozi, Omid (IRI)	60 kg	26.46
Kim, Hyeon-Woo (KOR)	66 kg	23.75
Vlasov, Roman (RUS)	74 kg	21.83
Khugaev, Alan (RUS)	84 kg	21.80
Rezaei, Ghasem (IRI)	96 kg	26.96
Lopez Nunez Mijain (CUB)	120 kg	29.96
Women (27.70)		
Vorobieva, Natalya (RUS)	48	21.20
Saori Yoshida	55	29.84
Kaori Icho	63	28.15
Hitori Obaro Sakamoto	72	31.59

Table 1. Ages of the wrestlers in the 2012 London Olympics

The range of ages are shown in tables 2 and 3 which list the oldest and youngest champions respectively. The youngest champion is 18.91 years old and the oldest is 41.52.

Table 2. Oldest Olympic Wrestling Champions by Style

Oldest Olympic Champions			
Freestyle	Games	Weight	Age
Arsen Mekokishvili (USSR)	1952 Helsinki	87+ kg	40.27
Gyula Bobis (HUN)	1948 London	87+ kg	38.81
Valentin Jordanov (BUL)	1996 Atlanta	52 kg	36.51
Kaarlo Maekinen (FIN)	1928 Amsterdam	56 kg	36.21
Greco Roman			
Adolf Lindfors (FIN)	1920 Antwerp	82+ kg	41.52
Anatoli Roschtschin (USSR)	1972 Munich	100+ kg	40.49
Johanes Kotkas (USSR)	1952 Helsinki	100+ kg	37.48
Kaarlo Anttilla (FIN)	1924 Paris	62 kg	36.85
Carl Westergren (SWE)	1932 Los Angeles	87+ kg	36.80
Women			
Hitomi Obara Sakamoto (JPN)	2012 London	72 kg	31.59
Saori Yoshida (JPN)	2012 London	55 kg	29.84
Kaori Icho (JPN)	2012 London	63 kg	28.15

Table 3. Youngest Olympic Wrestling Champions by Style

Youngest Olympic Champions			
Freestyle	Games	Weight	Age
Saban Trstena (YUG)	1984 Los Angeles	52 kg	19.6
Togrul Asgarov (AZE)	2012 London	60 kg	19.90
Sanasar Oganessian (USSR)	1980 Moscow	90 kg	20.48
Magomedgasan Abushev (USSR)	1980 Moscow	62 kg	20.71
Il Kim (PRK)	1992 Barcelona	48 kg	21.02
Greco Roman			
Islambek Albiev (RUS)	2008 Beijing	60 kg	19.62
Suren Nalbandyan (USSR)	1976 Montreal	68 kg	20.13
Yerlikaya Hamza (TUR)	1996 Atlanta	82 kg	20.13
Shazam Safin (USSR)	1952 Helsinki	67 kg	20.30
Alexander Karelin (USSR)	1988 Seoul	130 kg	21.00
Women			
Xu Wang (CHN)	2004 Athens	72 kg	18.91
Kaori Icho (JPN)	2004 Athens	63 kg	20.19
Jiao Wang (CHN)	2008 Beijing	72 kg	20.61

The youngest champions for men seem to be present in the lighter classes, with 7 out of 10 youngest champions were from weight classes less than 70 kg. However, Alexander Karelin, one of the greatest wrestlers and heavyweights of all time, won his first title as the 7th youngest Olympic wrestling champion of all time. What one generally sees is that the oldest competitors come from the heaviest weight classes. Six of the ten oldest champions come from the highest weight class. Togrul Asgarov (AZE) is the most recent addition to the youngest list for men. It is interesting to note that Hamza Yerlikaya won the 1996 GR 82 kg title at 20.13 years of age, and also won a World Championship in 1993 when he was just 17.29 years old! It is somewhat difficult to generalize from the women's results at this time. The youngest Olympic wrestling champion of all time is Xu Wang (CHN), while Kaori Icho is present on both the youngest and oldest lists!

Reasons for Early and Late Success There are factors operating at both ends of the age distribution affecting

the chances for observing champions that are either very young or relatively old. Most young champions are certainly prodigies with a “genius” for wrestling. Some factors that may increase their expression as early champions are:

Growth and Maturation There has been a steady secular increase in growth – an increase in height and weight at all ages from birth to adulthood. There has been a general increase in the height and weight of Olympic athletes during the last generation (20). This has been matched with a concomitant acceleration in the maturation of certain physiological functions in children, especially in the area of sexual maturity. There has been a steady decrease in the age of menarche – from 17 in 1840 to 13.5 in 1960 (24). A similar trend of earlier maturation has been observed in boys who reach their maximum height at an earlier age than a generation ago. **Talent Identification** Systematic identification and selection of young athletes, along with earlier specialized training could also be factors. **Weight Training** The use of weight training is now widespread in the training regimens of most young athletes. Most physiological parameters peak in the early 20's. At the other end of the age spectrum, we know that physiological functional capacity declines with age. There are declines in aerobic capacity, peak strength and power.

Factors that may increase the longevity of wrestling champions are: **Training Programs** that slow the aging process. What may have formerly been considered “normal” deterioration may be forestalled by continuous training. **Preservation of Strength** Many of the oldest champions compete in the heaviest weight class. Is strength more of a factor in this class? Bulgarian research indicates that the competitors in the heaviest weight categories have the longest careers at the international level of 10.7 years (15). **Improved Tactics and Psychological Preparation** Veterans can take advantage of experience. This could be especially valuable in controlling competition stress and application of tactics and strategy. **Improved Sports Medicine** Improved training, which again includes weight training, along with better medical care, may provide athletes the ability to withstand the rigors of training and competition. This includes prevention, better treatment of injuries, and rehabilitation. Surgical repair is an important factor in extending careers. **Professionalization of Sport** This socio-cultural phenomenon has provided athletes with the financial support so an athlete can remain in sport longer, before having to go on to their “real world” career. Some examples are support through sport federations, endorsements, sponsorships, and prize money.

What is the Life Expectancy of Wrestlers?

Sarna (23) has studied former Finnish male athletes and controls to investigate the effects of long-lasting participation in vigorous sports on health, and longevity. He found that former aerobic sports athletes (endurance and mixed sports) in particular have high total and active life expectancy and low risk for ischemic heart disease and diabetes in later years. Overall, the benefits of physically active life-style on health were clearly higher than the adverse effects. Endurance sports (runners and cross-country skiers) had a life expectancy of 77.5 yr; in team games (soccer, ice hockey, basketball, jumpers and sprinters) 75.1 yr; and power sports (boxing, wrestling, weight lifting, and throwers from field athletics) 72.2 yr; and in the non-athlete control group had a lifespan of 70.9 years.

Now we have another empirical data point for our timeline for wrestlers – a lifespan of 72.2 years. These studies no doubt, need to be expanded to include women wrestlers, along with athletes from the rest of the world.

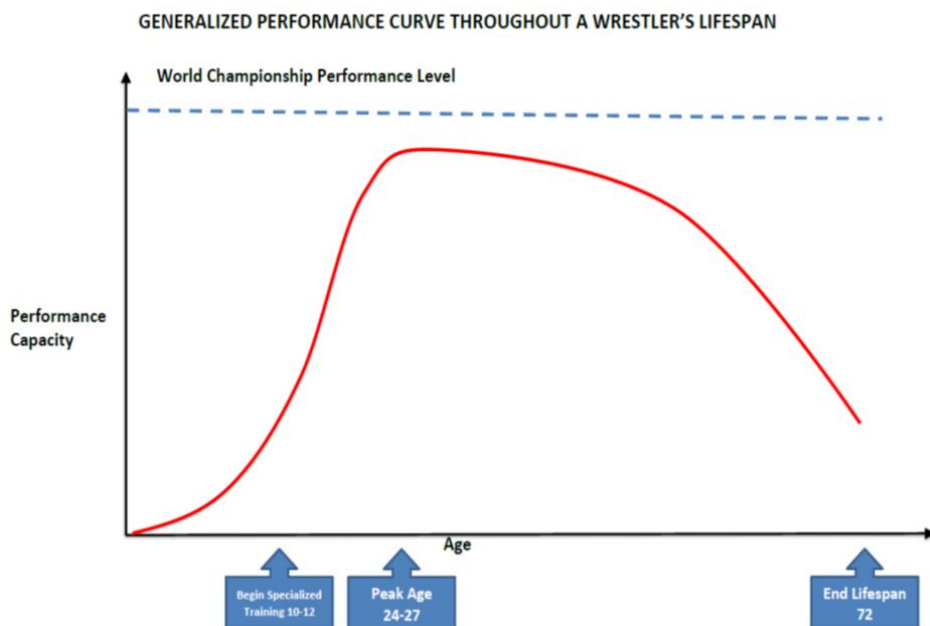
When should wrestlers begin training? This very important question is not as easily settled. We have seen an evolution to starting children in wrestling programs at increasingly younger ages. In the USA and Japan, it is not uncommon to see 6 and 7 year olds in competition. What are the effects for the long-term?

There are several forces at work in sport that are pushing this trend. There are parents, intent upon seeing their children as champions, who believe that they can gain an advantage over others, with an earlier start. Sport organizations compete to attract numbers to their sport, and they feel that early involvement and identification can make these children “theirs.” What does the data show?

Much of the information we find is from expert recommendations. Yuri Shakhmuradov recommends that specialized training begin between 10-11 years of age. Josip Maric in his book “Wrestling freestyle” (17) argues that the best time is between nine and ten years. Tudor Bompa (5) pushes the limits for a year more, and says that the best time is between the eleven and thirteen. Dragan Milanovic in his book “Theory and methodology of training” (19) lists approximate date for the beginning of systematic training in wrestling from eleven to twelve years. Baic (1) has done preliminary work in this area for males and has listed the age reported for wrestling specialization for the Greco Roman champions from Istanbul WC of 2011, European Championships 2012 and the London Olympics

2012, and found a starting range from 9-20 years old, with the majority taking up wrestling between 10 and 12 years of age.

Grigore (13) of Romania has investigated this issue with females and has observed that the average age of females champions taking up wrestling around 12 years, but there was significant variation. The time required to achieve top performance in wrestling female was 10-12 years, thus arriving at the average age of women's Olympic champions.



From this evidence, both from empirical data and expert recommendation, it is safe to say that the optimal time to begin wrestling specialization, for both boys and girls, is from 10-12 years of age.

We now have located three major milestones on the wrestling performance capacity curve shown in fig. 1.

Figure 1. Important milestone ages in wrestlers

A larger question then remains - What happens to a large number of those who started their wrestling specialization at 6-7 years of age? The Japan Wrestling Federation emphasizes guidance from early childhood with their female wrestlers, but stresses that the emphasis is on fun and acquiring a feel for the essence of the sport. (Yukinori MIYABE).

We must identify the important growth and development considerations and specific implications for our sport of wrestling. Many programs do not have a long-term perspective. Many coaches are competent in developing training programs, but in many cases children are specialized at too young of an age. When players specialize too early they can create imbalances in musculature, increase the potential for burn out and cap their athletic potential by not developing a broad base of athletic movement skills. Young athletes who participate in a variety of sports have fewer injuries and play sports longer than those who specialize before puberty. Well-rounded, multisport athletes have the highest potential to achieve. In our current system, training in early years focuses on outcomes (winning) rather than the developmental process (optimal training). Damage done between ages 6-10 and 10-16 cannot be fully corrected (players/athletes will never reach their genetic potential) and national training or sport centers receiving mediocre athletes -- regardless of funding and expertise -- cannot recover from the "damages" of earlier training! (2,10,12)

USE A BROAD BASED, OVER-ALL, OR MULTILATERAL TRAINING

Variety is necessary! Include plenty of gymnastics. Encourage athletes to strive to have at least one to two days off per week from competitive athletics, sports specific training, and competitive practice (scrimmage) to allow them to recover both physically and psychologically. Encourage the young athlete (under 15y) to take at least two to three months away from a specific sport during the year.

AVOIDING HIGH DROP-OUT RATE

Knowing why children participate in sports can provide a good perspective for developing programs. Why children participate? (12) It is important to note that fun is the number one reason for participation.

1. **Fun**
2. To improve skills
3. To stay in shape

4. To do something one is good at
5. For the excitement of competition
6. To get exercise
7. Affiliation-to play as part of a team
8. For the challenge of competition
9. To learn new skills
10. To win

EARLY VS LATE MATURERS

The concern is not only for the late maturers, but also for the early maturers. Once the average and late maturers catch up, the early maturers are left feeling frustrated as they have always relied on their advanced developmental age and, as a result, some did not develop the necessary skills or fitness. Unfortunately, the early maturers can often leave the sport around the age of 14 or 15 due to frustration.

"Unfortunately, in developmental sport programs, we often don't allow late maturers the time to let their physical maturity catch up and their skills develop. Instead, children often leave the sport early because of lack of success and extreme frustration. This seems to hit the late maturing boys the hardest because they are at an extreme disadvantage. Ironically, they could have the potential to be better athletes, but we have to keep them involved in quality sport programs at the younger ages to make sure they continue with their skill development" (Lawrence, M. (1999). US Swimming Sport Science Summit. Colorado Springs.).

USE PEAK HEIGHT VELOCITY and OTHER MEASURES

Peak height velocity is a key reference point for sport readiness. Age at peak height velocity refers to the age when the rate of increase of height reaches its maximum. In order to use this measure effectively, regular anthropometric monitoring is required. The recommended frequency of measurement is every three months. In order to effectively monitor the rate of change, it is very important that the frequency of measurement is consistent, and started at an early enough age to identify important PHV changes at pre-puberty ages. One must use precise standardized technique (2)

SUCCESS?

The bottom line is that it takes an enormous amount of work to become an elite athlete. This is done through a diverse sports movement and sports skills background. Once this foundation is laid, it takes years of deliberate practice to develop an elite performer at the highest level. This approach is supported by The Path to Excellence, which provides a comprehensive view of the development of U.S. Olympians who competed between 1984 and 1998. The results reveal that U.S. Olympians begin their sport participation at the average age of 12.0 for males and 11.5 for females. However, their true success should be in noting the number of wrestlers who are still part of the sport 8-10 years later! We are well aware of the programs who are poorly done, or youngsters who are not ready. (12)

As we move forward in the further development and growth of the sport of wrestling, we must acknowledge the value of all of our wrestlers, and not merely focus on the champions. We must be careful that our talent identification and selection processes are appropriately administered, so we do not create many cast-offs, but athletes who love the sport. We must view techniques such as genetic testing with caution, as they could take the drama and anticipation from sport.

TRAINING NEEDS OF THE MATURE ATHLETE

Prolonging the careers of our wrestlers is generally desirable. We can individualize their plans and emphasize some important areas:

- ✓ REDUCE COMPETITIONS
- ✓ DECREASE VOLUME
- ✓ RESTORATION
- ✓ VERY INDIVIDUALIZED PLANS
- ✓ MAINTAIN BASIC FITNESS
- ✓ REHABILITATE INJURIES

Strength

Studies indicate that peak muscular power exhibits a considerably less rapid rate of decline with age than maximal aerobic capacity and appears to decline less rapidly in the upper limbs compared with the lower limbs.

Reaction Time

Simple reaction time shortens from infancy into the late 20s, then increases slowly until the 50s and 60s, and then lengthens faster as the person gets into his 70s and beyond.

Flexibility

It decreases. The good news is that some studies, but not all, show improvements in function when individuals engage in exercise programs that involve stretching exercises. Wrestlers must take measures to regain total flexibility following injury.

A special recommendation for Veterans wrestling comes in light of an occurrence when an American competitor, 52, collapsed during his opening round match of the 2009 Veterans World Championships in Kouvola, Finland. He received immediate medical assistance, but those providing care could not revive him. The wrestler was competing at 130 kg/286 lbs. in Div. D (51-55 years old). A. Pre-participation Cardiovascular Screening of Elderly Wrestlers is the recommendation of researchers who screened veterans competitors in Iran and found

POST RETIREMENT FROM COMPETITION

This portion of the hypothetical wrestling performance curve could be renamed as the capacity for good health. We know the value that sport participation can add to life. We state the health benefits, but we are often caught in the dilemma famously stated by the German philosopher Bertolt Brecht, "Great sport begins where good health ends." The body pays a toll for the great amount of stress that wrestling can cause the body. There are important issues that must not be ignored! These include:

MUSCULO-SKELETAL PROBLEMS (OSTEOARTHRITIS)

We must create training structures that can minimize damage. This includes identification of exercises that can be replaced by those that do not cause problems for the future. Diezemann (8) has identified certain "traditional" bridging exercises that could be modified in order to prevent cervical damage. Other vulnerable areas are knees, hips, back and shoulders.

FITNESS MAINTENANCE AND BODY WEIGHT MANAGEMENT

As wrestlers move out of competitive wrestling they must be counseled regarding the necessity of maintaining a healthy body weight and include appropriate activity into their lives. An increased incidence of overweight, obesity and indicators of chronic disease among ex-collegiate wrestlers has been reported in the US. (Gunderson)

Repeated cycles of weight loss and regain appear to enhance subsequent weight gain and may predispose to obesity. (21)

CARDIOVASCULAR CONCERNS

Cardiovascular adaptations to exercise have been systematically defined and differ with respect to the type of conditioning: endurance training (sometimes also described as dynamic, isotonic, or aerobic) such as long-distance running and swimming; and strength training (also referred to as static, isometric, power, or anaerobic) such as wrestling, weightlifting, or throwing heavy objects. Sports such as cycling and rowing are examples of combined endurance and strength exercise (16,18)

There is no evidence at present showing that athlete's heart remodeling leads to long-term disease progression, cardiovascular disability, or sudden cardiac death. The wall thickening that is seen in power/static/resistance trained athletes is seen by some to be seen as undesirable consequence of training, since it mimics the hypertrophy seen in some heart disease. While that possibility may exist, there is at present no evidence to support it.

Endurance athletes possess a greater proportion of slow twitch (type 1) muscle fibers which correlates positively with a favorable lipid profile in relationship to remaining free of cardiovascular disease. Power athletes, such as sprinters and weight lifters have a high proportion of fast twitch (type II) muscle fibers with low oxidative capacity. unfavorable lipid profile, a high proportion of fast twitch fibres has been associated with obesity, hypertension, and insulin resistance. Athletes with ability in power sports seem to have a higher risk of developing cardiovascular disorders than those with in endurance sports. While wrestling certainly has a large power component, it is most often classified as a "mixed" sport along with boxers, basketball, rowing and soccer. (16) (Kujala)

Elastic artery stiffness and large artery wall thickness are major indicators of arterial health and risk of age-associated cardiovascular disease. Masters athletes for whom training and competitive sport require primarily or exclusively intensive resistance muscle activities exhibit a less favorable arterial function-structure profile than their endurance-trained peers. (18)

There are limited data defining the adaptations of athlete's heart in females, in modestly trained individuals in youth sports programs, and in blacks and other minorities. This needs to be addressed.

PSYCHOLOGICAL ISSUES

Former wrestlers do not seem to be at a greater risk for psychological issues. Research has shown that athletes who had participated in power/combat sports and team sports were more extroverted than referents. Endurance, power/combat, team and shooting sport athletes were more satisfied with their lives than were the referents. (4). This does not mean that wrestling governing bodies should ignore issue such as depression, alcoholism and drug abuse in their former wrestlers. A very sad case in wrestling occurred in 2004 when Mikael Ljungberg of Sweden, 34, died at the psychiatric clinic in Mölndal, when he hanged himself with a sheet in the bathroom. He was one of Sweden's greatest wrestlers of all time and one of our most beloved athletes. His brother Jonas told me, " the difficulties of adjusting to a life outside the Championship stadiums baffled him. The dark forces began to tear everything harder. Now it is our duty to remember you. And it is our duty to help those athletes who find it difficult to find meaning after his career has gone out and it's getting darker."

SUMMARY

It is important that we study the entire wrestling experience, from beginning to end, so that we may best serve the total athlete and total person. Include selection and comments on genetic testing. We have learned from the IOC challenge of 2013. In the words of one of our leading wrestling administrators, Georgiy Byrusov (6), this is where we must focus:

"Wrestling is part of the harmonious development of the individual. This traditional sport is very tightly woven into the culture of many countries. The primary task for FILA – is to bring wrestling to the Olympic masses. Make it more accessible, popular and spectacular. To do this, of course, have a lot to work with. We need to provide for young people to go into schools and clubs and have the opportunity to engage in this simple, very harmonious and rewarding sport. Without this, we will not be able to compete for the younger generation. "

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