



Somatotype And Athletic Performance

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For more than one hundred years scientists have attempted to describe the physique characteristics of elite athletes with the objective of relating their physiques to athletic performance. Theoretically, the most successful athletes are those with the appropriate structure to perform their event and Olympic or world championship athletes represent the optimum combination of genetic and environmental influences to produce maximum performance. Since the first studies on athletes at the winter and summer Olympics in 1928, major studies have been conducted on athletes at six different Olympic Games. In the main, anthropometric data has been collected in these investigations since the methods are non-invasive and do not interfere with the subject's performance. A major advantage of using anthropometry to study the physique of elite athletes is that large amounts of data can be collected quickly.

Anthropometry is the most commonly used method of physique assessment in athletic populations and is the only method that has been validated against a cadaver sample. The word Kinanthropometry, which has developed from anthropometry, is concerned with measurement and evaluation of different aspects of human movement and individual variation in body shape, size proportion and composition.

The purpose of physique assessment

Describing the link between exercise performance and body shape, size, proportion and composition provides clues to the ideal physique for a sport or event. Collecting data on the elite athlete can therefore be used as a research tool to facilitate an understanding of the link between performance and physique and to provide on-going feed-back to the coach and athlete. It is important to remember that although an athlete may have the appropriate physical structure, factors such as physiological function, psychological makeup and biomechanical constraints all contribute to athlete performance. The assessment of physique has four major applications

(1) identification of talented athletes (2) to assess and monitor the growing athlete (3) to monitor training and performance (4) to determine optimal muscularity and adiposity for weight class events.

Somatotyping is a method for physique classification, which provides an overall description of physique. It provides a numerical, three-number rating representing the components of endomorphy and ectomorphy, which are independent of body size. The Heath-Carter method of somatotyping is the most widely used it provides for both photoscopic and anthropometric ratings of physique and demonstrates the relative dominance of. (1) endomorphy, or relative fatness, (2) mesomorphy, of relative musculoskeletal robustness. and (3) ectomorphy, or relative linearity

Identification of talented athletes

Describing the physique of the elite assists in understanding the link between performance and physique Within a sport there will be a degree of individual variation in physique that reflects the athlete's genetic and ethnic make-up as well as their dietary intake. For some sports there is a much greater tolerance in physique as other performance factors dominate. for example tennis and football Other sports however. tolerate a very narrow range in certain physique characteristics at the elite level. In the sport of gymnastics. female gymnasts must be lean and muscular but also cannot be tall.

To Assess and Monitor the growing athlete

Longitudinal anthropometric data provides the best data for monitoring individual growth patterns while cross-sectional analysis results in a smoothing of the growth curves The timing of maturation varies considerably between the earliest and the latest maturing athlete In boys, as the strength spurt tends to occur once the height velocity is falling, for sport selection it is important to recognize that development age is more relevant than chronological age Similarly for girls, the onset of menarche signals the development of the secondary sex characteristics which may be followed by an increase in adiposity Delayed maturation can occur in female athletes particularly for those who achieve success in ballet or gymnastics By monitoring growth it is possible to examine the link between performance and maturation

To monitor training and performance

Skinfold measure is the most common anthropometric measures taken on elite athletes for the purpose of providing an estimate of the adipose tissue mass Whilst it is actually a double Layer of subcutaneous adipose tissue and skin that is being measured, it is commonly referred to as 'body fat' Many sports have 'cut off. points or target scores for the sum of skinfold s value In sports such as distance running lower levels of 'body fit' are generally associated with better performances.

The appraisal of body composition can provide valuable data for both the athlete and the coach through the sequential monitoring of the influences of training and nutrition Neither body mass nor the body mass index (BMI) is acceptable in distinguishing the contribution of various

tissue mass proportions to body mass The O-scale physique assessment system is a practical tool for monitoring changes in skinfold and girths.

To determine optimal muscularity and adiposity for weight class events

When transporting the body in the performance of athletic tasks where the body weight must be supported adipose tissue does not contribute to the movement Adipose tissue as 'ballast substance' since skeletal muscle provides the propulsive force to move the body In weight category sports such as light weight rowing, boxing and wrestling, athletes aim to have a high 'power-to-mass' ratio whereby, for a given body weight, adiposity is minimized and muscularity is maximized It is extremely common in weight-category sports for athletes to undergo rapid loss several days before competition to 'make weight This can be extremely detrimental to performance. Anthropometric assessment can assist in determining the appropriate weight class for the athlete as most aim to compete in a lower class to gain a competitive advantage. Athletes are advised to undertake weight reduction early in the season and avoid rapid weight gain post competition. Monitoring of skinfolds and skinfold corrected girths will indicate changes in the adipose and muscle masses.

The maximal aerobic performance capacity in girls reaches a plateau from 14 years onwards while in boys it increases up to the age of 18 years. Thus, even though the aerobic capacity is fully developed aerobic performance continues to improve. That is because other growth factors, such as larger levers, greater musculature, etc. are still developing and govern the effectiveness and mechanical efficiency of aerobic activities Ectomorphs have larger leverage, which helps mechanical efficiency in aerobic activities. Mesomorphs have greater musculature, which helps glycogen storage mechanics.

Somatotypes show statistically significant with the level of performance in some sport-groups with an increase in the mesomorphic component (in ballgames and martial arts) and in the endomorphic component (in swimming). Comparisons with other sport-groups from literature were greatly limited by several genetic and environmental factors.

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