BODY SIZE *and* SPRINTING CHARACTERISTICS *of* 1998 NATIONAL TOP'S ATHLETES

by Bill Sands, Ph.D. and J. R. McNeal, M.S.

"Now more than ever gymnastics is under the critical lens of the public eye and concerns about the effects of hard training on growth and development of children have been raised."

On December 3-6, the 1998 National TOP's training camp was held at Tulsa World of Gymnastics in Oklahoma. Eighty-nine gymnasts attended the camp and participated in the research testing rotations. The purpose of the anthropometric testing was to begin a database of our young athletes which will track growth throughout the gymnast's career. Now more than ever gymnastics is under the critical lens of the public eye and concerns about the effects of hard training on growth and development of children have been raised. The gymnastics community must begin to record growth statistics on its child athletes so that it can defend its position from a point of objective data. This information can then also be compared with similar information from other countries and other sports. In addition to the anthropometric measurements of the athletes, their sprint speed and acceleration was also tested. We were interested in determining how long it takes for the athletes to reach top speed, and if there were age specific differences. Because peak speed can be maintained for a very short period of time, knowing when athletes reach top speed may indicate optimal running distance to the vault.

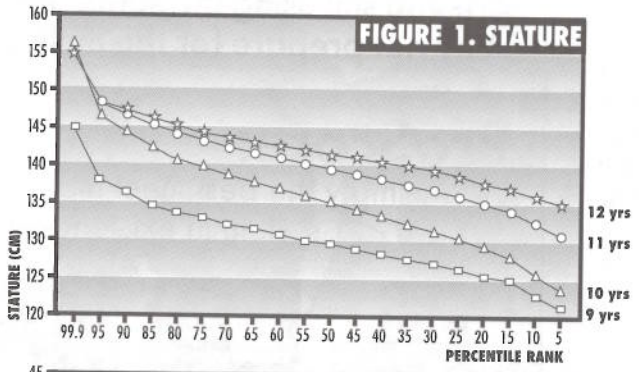
What We Found: Anthropometrics

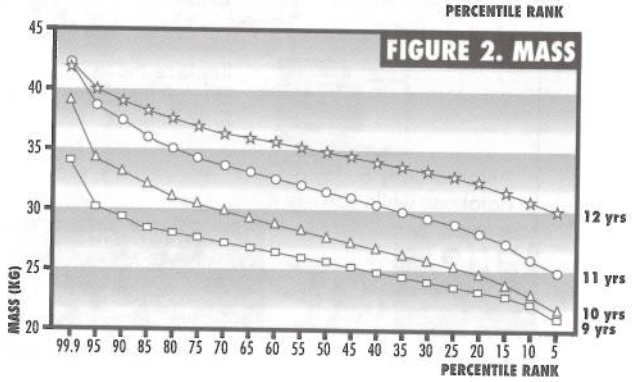
Figures 1-6 describe the normative values for each age group for several of the measured variables. Due to space, not all variables are presented here. The skinfold sites measured here were tricep, bicep, subscapular, abdominal, suprailiac, anterior thigh, and calf. These values were summed to achieve the final score. The ratio of sitting height to standing height provides us with an indication of the relative length of the lower extremity to the torso. This group of gymnasts tended toward a fairly equal distribution of stature between the torso and the lower extremity. Finally, the hip:shoulder ratio provides us with an indication of the amount of "V" shape in the torso. The closer to 1.00 the score is, the more square the body shape. The further from 1.00, the more V the shape.

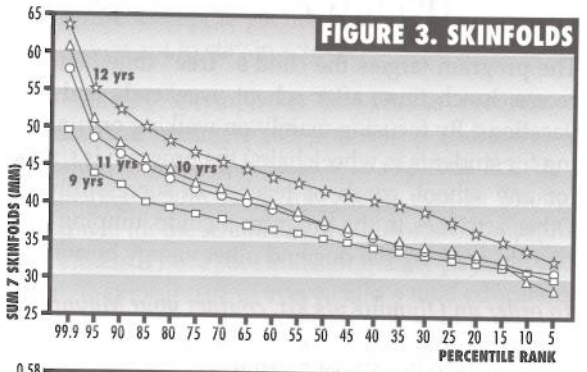
An athlete with a score in the 50th percentile would be average for the national TOPs group. Table 1 shows the approximate percentile rank of the average TOPs athlete's stature and mass compared to national averages for American girls. This table shows that TOPs athletes are generally smaller and lighter than the average age-matched girl. This is, of course, no surprise. As more data is collected and growth is tracked over the next few years, this information will be more important.

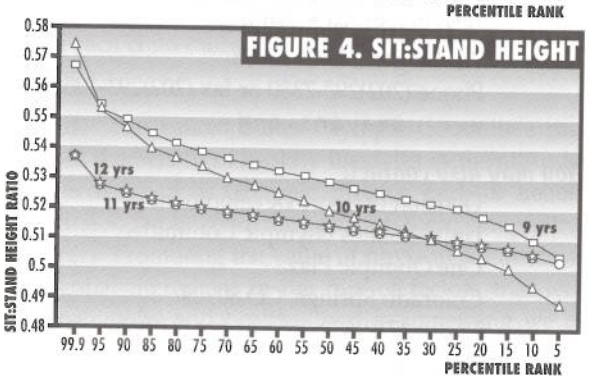
TABLE 1: Approximate Percentile Rank of TOPs Athlete Stature and Mass Compared to a Sample of American Girls

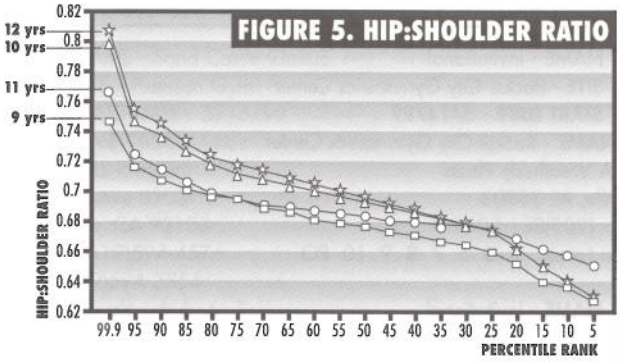
	STATURE	MASS
9 yrs	25-50th	25th
10 yrs	25th	25th
11 yrs	25th	25th
12 yrs	5-10th	10th

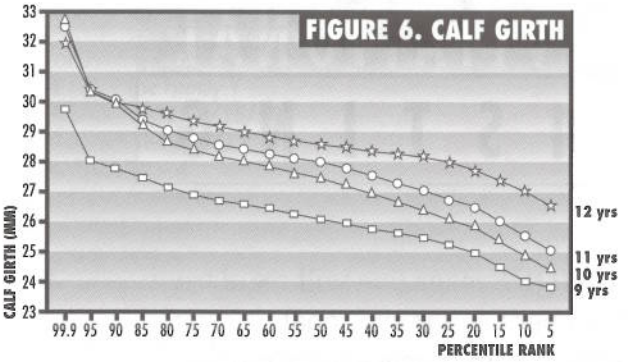












What We Found: Sprinting

To determine speed and acceleration of the run, infrared light beams were placed across the running path. As an athlete sprinted, her body would break the light beam and a time would be recorded. These light beams were placed every 7 feet along the 70 foot runway. Figure 7 shows the combined velocity curve for all TOPs participants. The different age groups were so similar in their speed and accelerations profiles (acceleration is indicated by the "steepness" of the curve) that portraying each curve individually was not necessary. Data on non-athlete children indicates that increasing age and mass lead to greater speed and acceleration abilities. Since the TOPs athletes are a very select group, their physical profiles are remarkably similar across ages. The athletes were also able to reach peak speed much sooner than what has been observed in non-athlete children, and even adults. Top speed on average occurred at approximately 40 feet. Since top speed can be maintained only for a very short time, it may be wise to shorten the length of the run-up for vault in order to contact the board while still at top speed. ■