Bowling This Month

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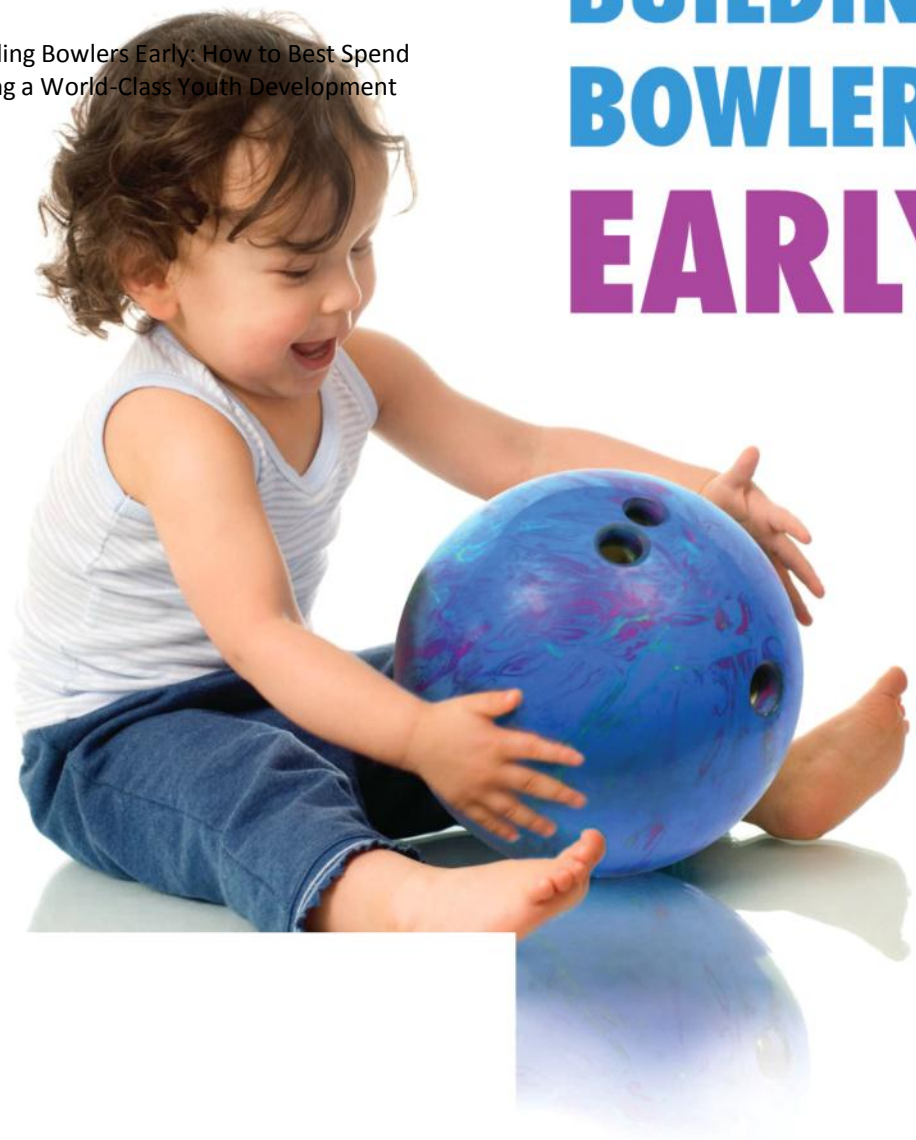
BUILDING BOWLERS EARLY



Slowinski at-large Building Bowlers Early: How to Best Spend 10,000 Hours in Building a World-Class Youth Development Program

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How to best spend 10,000 hours

Recommendations for a world-class youth development program

"For a range of intellectual and athletic abilities, if an individual wants to reach world-class level, he or she must start young. You built the brain you have today by interacting with the environment while you were growing up and your neural connections were still myelinating. You can adapt those abilities in many ways, but neither you nor I will become a world-class pianist, chess player, or tennis pro unless we began our training when we were children."

— Dr. R. Douglas Fields

Many readers will be familiar with the ten year or 10,000 hour of training rule. Specifically, this informs us about how many hours of purposeful training are required to reach an elite level of performance. This rule is a well-documented research-based fact about the minimum practice time it takes for an individual to reach the highest level in an activity. This 10,000 hour rule was first articulated when Simon and Chase (1973) studied the knowledge of chess masters and estimated that cumulatively these experts had seen 10,000 to 50,000 hours of moves over their career.

Yet, it is not only the number of years or number of hours an individual invests that leads to becoming a world-class performer. Starting a sport at 25 years old and practicing for ten years will not make you a world champion.

Rather, and more importantly, it is the age at which an individual begins the sport and how they practice that will determine if they can possibly reach the highest echelon in their sport. Due to how the brain evolves and changes in both grey and white matter over childhood, to maximize their chances, an individual must start before the age of ten and engage in deliberate practice activities.

A person's nervous system is structured similarly to the power lines which bring electricity to your house. Gray matter, or the hard wiring, transmits electrical signals encrypting our thoughts and actions. White matter, the fatty myelin, is similar to electrical wire insulation. It's wrapped around axons and works

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to promote conservation of the electrical signals sent across the wiring. This maximizes efficiency and the velocity at which the signals are sent.

Early exposure to a sport during key moments of brain development is a fundamental requirement for reaching a world class level due to the neural connections (gray) and insulation (white) that is developed with sport specific activities. Early exposure to an activity leads to more wiring and more insulation in key areas.

Synaptic pruning

A synapse allows neurons to pass an electrical or chemical signal to another cell. During the pre-teen years, the body undergoes a synaptic pruning process where weaker and infrequently used synaptic connections are eliminated. For girls, this process begins around ten years of age and in boys at around 12. This synaptic pruning process is why the highest performers in sport, music, or art normally begin at a very young age.

The parietal lobe is vital in one's spatial awareness of their environment as well as the body's movement within this setting. Parietal-lobe gray matter increases from birth to a maximum amount in pre-adolescence at age 11.8 for males and 10.2 years for females. After this, through the synaptic pruning process in the parietal lobe, the volume of gray area declines during post-adolescence and realizes a net decrease in volume.

The parietal lobe is responsible for spatial comprehension as it integrates sensory and motor information. The parietal lobe constructs a 3D representation of an individual's environment and the body's position within it. That involves both kinesthesia and proprioception. Kinesthesia is the sense of body motion and a key component of hand-eye coordination and muscle memory. Proprioception is the sense of the relative position of neighboring parts of the body to each other and the strength of effort being utilized in actual movement. In essence, proprioception serves as your physical movement feedback mechanism.

Highest performance levels begin young

Olympic medalists began on average at age 11, one and a half years earlier than those individuals who finished in 4th through 8th position, and two years earlier than those who finished 9th through 25th.

Finish Position in the Olympics	Started Sport Participation at Age
MEDALIST (1 – 3)	11
4th – 8th	12.6
9th – 25th	13.3

Gibbons et al. (2002)

This earlier starting age to reach the highest levels of expertise was mirrored in music, chess, and other artistic and sport endeavors. Notice the start before the synaptic pruning process.

	National Level	International Level	Highest Level
Violin		7.7	5
Piano	7.7	5	5
Chess (start age)	10.3	7.25	9.75
Chess (join club)	13.8	10.5	
Gymnastics	8.2		
Running	10.5		
Tennis		6.5	
Swimming	9.6	7.0	

Ericsson et al. (1993)

From the research on synaptic pruning, the findings above should not surprise you. Rather, it emphasizes how much of an impact there is on the final outcome when an individual begins a sport early. Those who

begin activities before the synaptic pruning period are significantly more likely to achieve a higher level of skill than those who start after this pruning period. In short, those who reach the highest world-class levels are wired differently. This illustrates the importance of when we need bowlers to begin. Youth development programs that start before the age of 10 will yield significantly more potential future champions. It doesn't' guarantee a medal, but is a necessary condition to becoming a world champion.

Myelination starts at five and continues to mid-to-late 20s

While gray matter begins being pruned away early in childhood, myelination (white matter) continues insulating neural connections which are used from the age of five through the mid-to-late 20s. Myelination is involved in the insulation of the synaptic connections and is essential in the speed of information sharing between neural connections.

To illustrate, expert pianists who began at any early age, (eleven or earlier), had myelination present throughout their brain while those who began during adolescence or later had myelination increases in only those regions which were still developing. A higher volume of myelin in five to eighteen year olds is correlated with intelligence. Consequently, starting early in bowling will lead to increased myelination in motor areas needed for an elite physical game.

How coaches provide feedback is important

We have established that athletes must start young in order to begin training before the synaptic pruning phase and ensure myelination in key areas used in their chosen sport. Yet, it is also vital for coaches to create an environment in which young athletes master skills and are self-confident. This is vital to keep athletes in the sport and continue developing skills. Some coaching communication and feedback types are more effective.

In 2008, Tzetzis and colleagues studied the impact of feedback type on both skill acquisition and self-confidence in youth athletes. The participants in this study were 48 young badminton athletes, all boys, ten to fourteen years of age with two to three years of practice experience.

Group A received positive feedback and instructional cues on how to correct technique. Group B received no positive feedback but instructional cues on execution errors. Group C was a combined method and the participants received positive feedback and instructional cues on errors and directions on how to correct them. Group D was a control group and completed their normal training. The athletes were randomly assigned into one of these four groups.

For developing new skills and fundamentals, Groups A and B outperformed Groups C and D, illustrating that error identification and/or error correction is vital in learning fundamental skills. For the acquisition of advanced skills, Group C outperformed all other groups, revealing the importance of both the recognition of errors as well as direction on how to correct them. In regard to self-confidence, Groups A and C, who both received positive feedback, had an increased sense of self-confidence.

From the findings, the impact of positive feedback is an essential component of fostering an athlete's self-confidence. As a general rule, coaches should strive to provide positive feedback as well as give instructional cues on errors and how to correct the technique. The combination of these efforts will help to ensure an athlete's self-confidence grows as well as facilitate their skill acquisition. For more advanced skills, as the author's state, athletes might need both descriptive and prescriptive feedback to improve.

Recommendations on the research realities

From the evidence presented in the article, the following recommendations are essential to develop world-class bowlers:

✪ Programs must promote skill, knowledge, and fun;

In the early phases of youth participation, Olympians started their involvement for the challenge, fun, and skill development. Here are the top six reasons for participating initially in their sport:

- Challenge/love of competition
- Fun
- Desire to be successful
- Competitive outlet
- Intrinsic value of sport
- Acquisition of skill

Accordingly, a youth program should focus on mastery and skill development, be fun, and have a competition component.

✪ Developmental programs must begin with children younger than ten years of age;

✪ Becoming world-class requires more than 10,000 hours of purposeful deliberate practice in an area of specialization;

✪ Synaptic pruning in children, aged ten to twelve, in the area of the parietal lobe eliminates brain connections that are unused or used infrequently. For those who begin before this period, their brain literally becomes wired for that activity;

✪ Olympic medalists began participating in their sport, on average, 1.5 years earlier than those who finished in 4th – 8th place and nearly 2.5 years earlier than those who finish in 9th – 25th. Olympic medalists started on average around 11 years of age, 4th – 8th place finishers around 12.6 years old, and those finishing 9th – 25th place started around 13.3;

✪ Myelination is a brain's white matter, which insulates neural connections. The myelination of an expert's brain is present in higher volumes. For expert pianists who started younger, the entire brain was myelinated compared to those starting at 13 years of age or after who had only partially myelinated brains. Practicing new skills increases the myelin as well.

Coaches are essential Well trained and certified coaches are essential throughout the program to ensure the bowlers are developing physically as well as internalizing skills and knowledge at each level. Due to the necessity of bowlers beginning early, coaches should strive to provide positive feedback as well as give instructional cues on errors and how to correct technique.

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