

Early specialization: is the price too high for young athletes?

Are there risks for early specialization in young athletes, and if so, is there a better developmental pathway?

Practice makes perfect – or so they say. However, when it comes to youth sport, can athletes have too much of a good thing? When high levels of performance in a particular sport are desired, athletes need to spend more time training for that sport. In young athletes, time constraints (due to the demands of school, college, exams etc) invariably means focusing or even specializing in that sport to the exclusion of other sports or physical activity pastimes. Indeed, researchers have suggested that the process of specialization is the key mechanism for attaining elite performance in a particular sport, due to the increased volume of time spent in intensive training for that sport⁽¹⁾.

The issue of early sports specialization Although sport specialization is a necessary part of attaining elite performance, too much specialization too early is considered detrimental to the health and well being of young athletes, both in the short and longer term. In particular, young athletes who specialize too soon are at risk of physical, emotional, and social problems⁽²⁻⁴⁾. According to the 'Developmental Model of Sport Participation' (see figure 1 on following page), there are two distinct pathways, which consist of either early diversification (so-called 'sampling') or early specialization⁽⁵⁾.

According to this theory, the sampling pathway (non-early specialization) allows children and young prospective athletes to acquire foundational skills that are necessary to allow the athletes to successfully specialize



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later, while still being able to experience the different social interactions with peers and adults, and reinforcing emotional and self-regulating skills needed for the future⁽⁶⁾. The emphasis on 'deliberate play' refers to the types of play that were once considered common for kids in the park and backyard such as soccer, baseball and basketball games, usually organized by children themselves. These are invariably designed to maximize inherent enjoyment, thus reducing the risk of 'drop out' in later years⁽⁵⁾.

By contrast, the early specialization pathway involves focusing on a single sport from an early age (often as young as 6 years old), and with an emphasis on deliberate practice rather than deliberate play. The phrase 'deliberate practice' refers to a 'highly structured activity that requires effort, generates no immediate rewards, and is motivated by the goal of improving performance rather than inherent enjoyment'⁽¹⁾. Early specialization is predicated on the basis that 'talented' children can be selected early trained accordingly, even though such a regimen is often not in accordance with the child's motivation to participate in sports.

FIGURE 1: THE DEVELOPMENTAL MODEL OF SPORT PARTICIPATION*

AGE		
17	Recreational years • Deliberate play: high • Deliberate practice: low	Investment years • Deliberate practice: high • Deliberate play: low • Focus on one sport
16		
15		Specializing years • Balance of deliberate play and practice • Reduce involvement in several sports
14		
13	Sampling years • High amount of deliberate play • Low amount of deliberate practice • Involvement in several sports	Early specialization and investment • High amount of deliberate practice • Low amount of deliberate play • Focus on one sport
12		
11		
10		
9		
8		
7	↑ SAMPLING PATHWAY ↑	
6	↑ SPECIALIZATION ↑	

Specialization pathway runs bottom to top one the right hand side; the sampling pathway runs bottom to top on the left hand side.
 *Adapted from Côté, Jean & Hay, John. (2002). Children’s involvement in sport: A developmental perspective. Psychological Foundations of Sport

EARLY SPECIALIZATION AND SUCCESS

Given the psychological and developmental downsides of early specialization (pre-pubescence), you might assume that there are real benefits in terms of reaching elite levels of performance that justify this approach. However, this assumption is NOT supported by the evidence. While it is agreed that sports specialization is a necessary step for athletic success, analysis of elite athletes suggests that *early* specialization is NOT necessary. For example studies have found that:

- Division 1 NCAA athletes are *more* likely to have played multiple sports in high school than lower division athletes, and that their first organized sport was different from their current one⁽²⁾.
- Of the 322 athletes invited to the 2015 National Football League Scouting Combine, 87% had played multiple sports in high school, while just 13% had only played football⁽⁷⁾.
- Only 0.3% of German athletes in Olympic sports selected at the youngest level were ranked internationally, and most elite athletes specialized in their primary sport later in life⁽⁸⁾.

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- In most sports, elite and successful athletes are more likely to have performed a diverse range of sports in early years, and specialized only later on⁽⁹⁾.
- Other studies on elite athletes show that intense training typically did not start until late adolescence, and that these athletes played other sports before specializing⁽¹⁰⁾.

Some advocates of early specialization have incorrectly interpreted some early research into this topic to claim that athletes typically need around 10,000 hours of practice/competition over a 10-year period to achieve success – ie early specialization is absolutely necessary⁽¹⁾. However, this data was actually based on chess players – not on athletes engaged in physical sport. In fact, more recent and robust research shows that athletes can achieve elite status with 10,000 hours of total deliberate play and deliberate practice time in all sports combined, and with only 3000 hours of sport-specific training – ie *without* early specialization⁽¹¹⁾.

INJURY AND EARLY SPECIALIZATION

Despite the hazards of early sport specialization, it’s very common for children

and adolescents (often driven by their coaches and parents) to participate in organized sports at a high level and to specialize in one sport early. Data suggests that sport participation by children aged 6 years or under increased from 6% to 12% in the first decade of the 2000s, but with 70% of children dropping out of organized sport completely by 13 years of age(9,12). It is likely that this high dropout rate is due to partly to boredom/burnout, but also partly due to overuse injuries(13).

Due to a lack of a uniform reporting protocol, the data on the actual incidence of overuse and overtraining injuries is not clear cut, although research suggests that overuse injuries could account for nearly a half of all athletic injuries in young athletes(14). The data we do have suggests that early specialization combined with intense training significantly increases the risk of overuse injuries, leading to a variety of undesirable outcomes such as pain, temporary loss of playing time and even early retirement from the sport(4,15). The factors that increase injury risk among early specializers are many, but include training volume, competitive level, and pubertal maturation stage(16).

HOW MUCH RISK?

The volume of training, especially deliberate practice, may be especially significant for injury risk. One study in high school athletes showed an increased risk of injury when the training volume exceeded 16 hours per week(17), while other research has identified that young athletes whose deliberate practice time exceeds double the time spent engaging in free play increases the risk of an overuse injury(18). And while the increased injury risk of early specialization is observed across a wide range of different sports, it appears that female athletes who participate in sports requiring early sports specialization (eg gymnastics) may be at particularly high risk of overuse injuries, as well as the female athlete triad (see [this article](#) for a more detailed discussion on the female triad)(19).

Finally, a meta-study (a study that pools data from previous studies) looking into the injury risk associated with early specialization makes for informative reading(20). This study pooled high-quality data from five other studies into injury risks associated with specialization in several thousand young (under 18 years) athletes. It found that athletes whose training had a high degree of specialization were nearly twice as likely (81% more likely) to sustain an overuse injury compared with athletes with low specialization. Further analysis showed that

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even moderate specialization appeared to be associated with a greater risk of injury (39% more likely) than low specialization. The conclusion was that in young athletes, there exists a simple stepwise increase in injury risk with increasing levels of specialization.

PRACTICAL IMPLICATIONS FOR YOUNG ATHLETES, PARENT COACHES AND CLINICIANS

Although some degree of specialization in young athletes may be required to reach elite performance levels, a large body of evidence suggests that this process should not begin until teenage years, and even then, it should be combined with a multi-sport balanced approach where playing for fun and enjoyment is a goal in itself. This ‘sampling’ approach is just as likely to lead to long-term success and less likely to lead to burnout, injury, possible health problems and early retirement from all sports. Long-term athlete development (LTAD) programs, which started in the 1990s in the United States, [Canada](#), and other industrialized countries, have tried to counter the detrimental effects of early specialization and year-round sports by offering a positive framework to develop physical literacy and elite athletes.

The take-home message is that parents, coaches or anyone else involved in planning the training structure and long-term goal setting of young athletes should be aware of the potentially pitfalls of early specialization. Instead, the goal should be to ensure that the overall training program structures take a long-term approach rather than relying on early specialization. This means emphasizing play, fun and enjoyment during the athlete’s early years, with only a gradual introduction of specialism once the athletes enters his/her teenage years. Even then, it is important to maintain a strong element of ‘play’ during the more focussed training, with the element of deliberate practice minimized until the athlete reaches at least 15 years of age!

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