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Could there be a Relationship between early Specialization and Load Management Practices in Professional Athletes

Daniel C* and Post EG

Department of Kinesiology, Concordia University, USA

***Corresponding author:** Carlos Daniel HHP, MS, CSCSR, PES, Department of Kinesiology, Concordia University, United States Olympic and Paralympic Committee 1 Olympic Plaza, USA, Email: Carlos.daniel@concordia.edu

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Abstract

This article explores the relationship between early sports specialization and load management, with a focus on youth sports. Emphasizing recommendations for diversified early sports engagement, the authors address challenges in implementing load management practices, potentially impacting the well-being of young athletes. The historical evolution of load management and its myths are discussed, extending the analysis to early sports specialization, outlining its risks, and debunking myths and common misconceptions.

The connection between early specialization and load management is discussed, highlighting the need for tailored strategies for young athletes undergoing intense, year-round training. The authors propose solutions, advocating for education, collaboration, and data-driven decision-making at both youth and professional levels. In conclusion, the article urges health professionals to play a pivotal role in fostering healthier, sustainable athletic environments for athletes of all ages and performance levels.

Keywords: Athletes; Practice; Relationship

Abbreviations: NBA: National Basketball Association; AOSSM: American Society of Sports Medicine.

Introduction

In recent years, early sports specialization and load management have garnered attention from both professional sports leagues and health professionals. Load management has been a controversial issue across all professional sports, with the media scrutinizing this practice, particularly in the National Basketball Association (NBA). However, the influence of early sports specialization on load management practices has received comparably less attention. The NBA, in partnership with USA Basketball, has recently made recommendations for youth basketball participation, emphasizing early sports diversification and late specialization [1,2]. However, while these recommendations are recognized by coaches, they often go unheeded, exposing young athletes to excessive load with little to no recovery plans or modalities [2,3]. At first glance, early specialization in youth athletes and load management practices at an elite senior level, may appear unrelated. However, as we delve deeper into the world of sports and athlete development, a connection emerges [3]. The pressure on talented young athletes is increasing, characterized by intense and unmonitored training regimens during their formative years. These mental and physical demands, in conjunction with schedule fatigue, often contribute to inadequate load planning and recovery modalities – both of which can impact future performance and durability [3,4]. This article explores the

relationship between load management and specialization in youth sports, addressing their definitions, histories, and implementation at various levels. We also discuss the challenges and myths surrounding these topics and suggest ways in which health professionals can contribute to their resolution.

Load Management

Load management, in the context of sports, is a comprehensive strategy that involves the systematic manipulation of an athlete's training workload to optimize their performance, reduce the risk of injury, and ensure their long-term physical and mental well-being [5]. It recognizes the delicate balance of stress and recovery for athletes in order for them to perform efficiently and effectively. Load management involves the effective use of training principles and encompasses the appropriate prescription of training volume (the amount of work an athlete undertakes), intensity (the level of effort or stress), and frequency. Properly managing these factors is essential to minimize the risk of overtraining, excessive fatigue, and injuries [5]. The history of load management can be traced to early scientific investigations into athlete performance and the recognition that athletes require structured periods of rest and recovery to achieve optimum performance [6,7]. Load management gained further prominence with advances in sports science and as a more systematic/ holistic approach to training evolved. Appropriate load management allows sports medicine practitioners to prepare athletes for the rigorous demands of competition, where the fine line between peak performance, injury prevention, and burnout is more apparent [3,8,9].

While load management is now widely accepted at the professional and elite levels of sports, it hasn't been without its challenges and misconceptions. Implementing load management may require a significant shift in coaching and training philosophies. Some coaches and athletes may be resistant to these changes, fearing that reduced workload will lead to a decline in performance [8] Managing athlete workloads effectively relies on data collection and analysis, which can be complex and resource intensive. A common myth is that reducing an athlete's workload will lead to an increase in performance. In reality, well-planned load management can enhance performance and reduce the risk of injuries [5]. Given the response to training load differs among athletes, load management strategies should be individualized according to the health and training status of athletes [3,5].

Where Does Early Specialization Fit In?

Early sport specialization is defined as "intentional and focused participation in a single sport for the majority of the year, that restricts opportunities for engagement in other sports and activities". It has become increasingly common, with parents and coaches hoping that intense and specialized training will give young athletes an edge in their chosen sport. Early specialization, which is often associated with excessive training volumes without a distinction of load, can be driven by the desire for success, scholarships, or professional careers [3,4]. Jayanthi, et al. [10] defines this specialized approach as an athlete dedicating themselves exclusively and intensely to one sport, with the intent of developing sport-specific expertise. Early specialization is characterized by year-round participation (greater than or equal to eight months a year), specializing before adolescence, and engaging in high volumes of deliberate skill acquisition and competitive play [1,3]. These young athletes who specialize may occasionally participate in other sports for recreation, but their primary goal is mastering one sport and achieving elite status through year-round, highly intensive involvement.

Highly specialized athletes are typically focused on reaching "elite" status and consequently face the heightened risks associated with specialization, including burnout, overtraining, and overuse injuries [1,3]. The path to elite status remains highly debated, particularly given the amount of deliberate practice required to achieve expertise [1,10]. Proponents of specialization commonly refer to the "10,000 hours in 10 years" concept of deliberate practice, which is often used in various fields outside of sports, as the rationale for intense focus on one activity [1,3,10]. This concept originates from the work of Ericsson, et al. who studied the practice volumes of expert violinists. Jayanthi, et al. [10] points out, that "The best musicians spent over 10,000 hours practicing alone, while their less successful peers had accumulated 7,000 hours or fewer, coinciding with critical periods of biological and cognitive development. Musicians began training around five years of age; those who began after age five years were unable to catch up". However, DiFiori, et al. [1] and Meyer, et al. both refer to sports studies indicating that world-class athletes in various Olympic sports and from different countries engaged only moderately in early practice with lower training intensity in their primary sports during their youth. Furthermore, world-class athletes in sports like basketball, field hockey, and soccer reported achieving international success with 4,000–4,500 practice hours, which is significantly less than the proposed 10,000-hour threshold [11,12]. While it is common for youth athletes to feel pressured to conform to the culture of deliberate practice in fear of missing opportunities by not playing their sport year-round [3], there is limited scientific evidence to support early specialization as a foundational base for long-term success in most sports [1,3].

Despite the widespread uptake of early specialization, there are several concerns associated with its use. Youth athletes who specialize early can be at a higher risk of overuse injuries. Athletes subjected to repetitive movements and high training loads without adequate recovery can lead to chronic injuries such as stress fractures, tendinopathies, and growth plate injuries [10,13]. Early specialization can also contribute to psychological stress, including burnout and mental health issues [4]. The pressure to excel in a single sport and the fear of letting down coaches or parents can be emotionally taxing for young athletes. Specializing early may restrict an athlete's exposure to a variety of sports and activities. This can hinder the development of fundamental movement skills and may limit their overall athletic potential [3,10,13].

Early Specialization and the Training Load Relationship

The transformation of youth sports over the last four decades is evident, with fewer opportunities for youth to participate in sports without some form of parental or coach-driven structure [3,4,14]. These organized sports activities have led to a shift from the primary goal of fun to a more intense and competitive emphasis, fostering an environment where specializing in a single sport is now considered the norm [3,14,15].

The acceptance of specialization has led to a decline in the number of multi-sport athletes at the youth and adolescent levels, as more athletes specialize at increasingly younger ages. Brenner [14] and Post, et al. [15] contend that while young athletes may not engage in multiple sports due to specialization, they are exposed to elevated levels of intense training loads by participating in multiple teams within their chosen sporting discipline (school and club). Post, et al. [4] expressed concern about this trend, noting that several medical organizations such as The American Academy of Paediatrics and the American Society of Sports Medicine (AOSSM) along with major professional sports leagues have issued position statements cautioning against sports specialization while also advocating for more research to be conducted that helps support training load recommendations.

Some of the common themes recommended by medical organizations and professional sports leagues are that young athletes should not engage in training exceeding the number of hours matching their age, with an upper limit of 16 hours per week [3,14]. They also emphasize that youth athletes should prioritize enjoyment, delay specialization until after puberty, explore various sports, ensure a minimum of two days off per week, and take three months off annually, splitting this time into one-month increments, from their primary sport [3,14-16].

Large amounts of load amassed on an athlete's body youth or adult can be detrimental if there is no balance between load exposure and recovery. It is important to recognize that the same principles that apply to monitoring training load, rest, and recovery for professional athletes should also be extended to youth athletes, largely due to the profound influence of professional sports on youth sports [3,15].

The common characteristics of professional sports, such as set number of matches and potential practice days in conjunction with scheduled seasons and off seasons, provides the platform and opportunity to track, identify, and prescribe the sources of load as pertain to practice, strength training, and competition. Youth athletes are subjected to the same training load streams are their adult counterparts without the resources that can assist in creating a balanced relationship between training, recovery, and performance. When you add the variable specialization, the exposure to load for youth athletes multiplies because as Post, et al. [15] stated youth athletes have year-round load streams from multiple sources. For example, youth athletes can play a full season of their sport while simultaneously playing on club teams both of which have matches and practices. Their "season" can then be followed by a summer tournament schedule that includes travel and additionally, a private or skill coach can also be entered into this equation.

The correlation between early specialization and load management becomes more evident in the context of youth athletes when we look at the following:

1. Unique Load Management Needs: Early specialization demands a more focused approach to load management because young athletes are often exposed to high-intensity training ≥ 8 months of the year. This is typically done with little or no monitoring and control of training loads to prevent overtraining and injuries.
2. Balancing Training and Recovery: Load management for early specialization should emphasize the importance of adequate recovery. Coaches and health professionals must ensure that young athletes have sufficient rest periods to avoid injury and burnout [2]. When properly integrated into a young athlete's development, load management helps mitigate the risks associated with early specialization. Additionally, strategic planning of rest and recovery periods becomes vital in ensuring these young talents maintain their physical and mental health [17,18] It is important to understand that a fundamental part of combating early specialization is to ensure young athletes are exposed to a holistic/well-rounded training program. More rest is not the only viable solution to resolve the issue as their exposure to repetitive movements that fail to create variation in movement qualities/skill remains. A well-structured

training program that prioritizes a foundation of fundamental movement patterns (i.e. hinge, squat, push, pull, jump and land) may provide more long term benefits in relation to injury reduction than just resting [19,20].

Conclusion and Recommendations

In addressing the challenges of early specialization and load management practices, education is vital. Coaches, parents, and athletes should be aware of the potential risks and benefits of early sport specialization. A balance between intensive training and recovery in youth athletes, requires collaboration among coaches, health professionals, and other stakeholders. Health professionals can play a key role by conducting regular health assessments, monitoring growth and development, and advising on injury prevention strategies. They can also provide psychological support to young athletes, helping them cope with the pressures associated with early specialization and load management. Addressing the challenges and myths surrounding load management at all levels of sports requires a multi-faceted approach with an understanding of how professional leagues address these topics and can influence youth sports. By addressing these challenges and debunking the myths surrounding load management, we can promote healthier, more sustainable, performance environments for athletes of all ages and levels. Health professionals, including sports physicians, physical therapists, and athletic trainers, can play a vital role in both settings by doing the following:

Youth Level

Promote Diversification: Encourage young athletes to participate in multiple sports, which helps develop a broader athletic skillset and is associated with a reduced risk of overuse injuries.
Education: Coaches, parents, and athletes should receive education on the principles of load management to ensure that training is balanced and safe.
Monitoring: Utilize wearable technology and data analytics to monitor youth athletes' training loads and recognize signs of overtraining.
Professional/Elite Level:
Data-Driven Decision-Making: Continue to advance the collection and analysis of performance and wellness data to make informed decisions about individualized load management.
Collaboration: Foster collaboration between coaches, athletes, and health professionals to ensure comprehensive load management strategies.
Mental Health Support: Recognize the psychological impact of how athletes understand the processes of training, recovering and performing, while providing mental health resources to athletes who may struggle with one or more aspect.

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