

# Current Sport Organization Guidelines From the AMSSM 2019 Youth Early Sport Specialization Research Summit

AMSSM Collaborative Research Network Youth Early Sport Specialization Summit\*

**Context:** Youth athletes may be at elevated risk for adverse health due to sport specialization. Sport organizations have developed guidelines for participation during growth and development.

**Objective:** To assess youth sport development guidelines using a 15-item framework across sport organizations and governing bodies in soccer, basketball, ice hockey, and swimming.

**Data Sources:** English-language results from January 1, 2000, to December 31, 2018, from published sport organization guidelines and athlete development plans.

**Study Selection:** Two investigators independently reviewed publications identified from sport organizations. A total of 23 guidelines were incorporated, including 5 general sport organizations and 18 sport-specific guidelines.

**Study Design:** Systematic review.

**Level of Evidence:** Level 4.

**Data Extraction:** Two investigators independently identified all recommendations that fit within a predetermined rubric of recommendations encompassing 4 domains: Psychological Development/Approach, Physical Development/Load, Facilities and Resources, and Timing and Monitoring of Specialization. Sport-specific guidelines on volume were summarized.

**Results:** Sport organizations and sport-specific guidelines had consensus on 2 items out of the 15-item: emphasis on early skill development and access to well-trained coaches. While recommended by all sports organization, multisport participation was emphasized by 3 of 4 sports, excluding soccer. Volume recommendations were inconsistent between and within sports. No group proposed methods to monitor athlete well-being.

**Conclusion:** This review highlights areas of agreement within sport organizations and governing bodies. Creating a framework to guide youth sport specialization may lead to specific and consistent guidelines.

**Keywords:** sport specialization; recommendations; athlete development

This article was sponsored by the American Medical Society for Sports Medicine (AMSSM) Collaborative Research Network's 2019 Youth Early Sport Specialization Summit. The goals of the Youth Early Sport Specialization Summit were to (1) conduct and present a rigorous review of the current scientific knowledge and (2) develop a "research roadmap" to drive future research efforts based on existing evidence in the field of youth athlete training and development. Systematic reviews on the topics of the impact of youth sport specialization

on career- and task-specific athletic performance<sup>18</sup> and on health outcomes are also available or in development. These reviews serve as the foundation for a scientific consensus statement aimed at addressing the research gaps identified in these reviews.<sup>16,17</sup>

Sport specialization is "intense training in a single sport at the exclusion of others."<sup>13,20,24</sup> The growth in youth sport specialization has received increased scrutiny by the sports medicine community to better understand its effects on

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participation and health. High volumes of training and competition typically coincide with sport specialization especially if the primary aim of participation is to improve performance. However, these behaviors may place the developing athlete at increased risk for lower extremity injuries<sup>21,25</sup> that are primarily overuse<sup>26</sup> and adverse psychological health consequences including burnout and cessation of sports participation.<sup>5,13</sup>

The sports medicine community and key stakeholders have proposed guidelines based on the limited available research and expert opinion to address knowledge gaps. In a companion review, we analyzed similarities and differences in recommendations from health organizations or health representatives of sports organizations published in medical literature to highlight the need for actionable recommendations and interventions regarding youth sport specialization.<sup>9</sup> This review resulted in identifying 15 elements across 4 domains: Psychological Development/Approach, Physical Development/Load, Facilities and Resources, and Timing and Monitoring of Specialization. Notably, no guideline or position statement reviewed covered all elements across these domains, and guidelines were primarily focused on elements related to physical development/load and specialization. Many questions remain unanswered, including the appropriate age and total exposure that poses risk for youth sport specialization.<sup>14</sup>

Sport organizations and governing bodies have developed separate guidelines for participation in youth sports. American Development Models (ADMs) are defined by the United States Olympic (USOC) and Paralympic Committee to encourage more Americans to engage in sports.<sup>38</sup> Other countries have developed Long-Term Athlete Development (LTAD) programs that are designed to guide sports participation by age and ability. It is necessary to identify recommendations on youth athlete health and development from national and international sport associations to understand the information presented to athletes and parents and to assess differences in recommendations across organizations within sports.

To date, no published review has compared ADM and LTAD models across team and individual sports. Therefore, this review aims to (1) compare sport-specific recommendations and guidelines from different organizations, including sport governing bodies from select sports, and (2) compare guidelines between these sports.

## DEFINING CRITERIA FOR RECOMMENDATIONS ON YOUTH SPORT PARTICIPATION

In conjunction with data from this systematic review evaluating sport organizations' recommendations,<sup>9</sup> recommendations were divided into 15 defined categories based on common elements. For the purposes of organization and discussion, these 15 categories were grouped into 4 thematic domains (Table 1).

Table 1. Categories of recommendations for youth sports participation

Recommendations
Psychological Development/Approach
1. Talent identification over talent selection
2. Instill passion for physical activity and sport
3. Create a broad definition of sport success
4. Promote safety, health, and respect for rules
5. Promote psychological development and well-being
Physical Development/Load
6. Account for differences in maturation
7. Emphasize fundamentals early
8. Institute integrated conditioning and injury prevention programs
9. Limit early organized participation and/or training
Facilities and Resources
10. Make sure parents are made aware of training, coaching, and best practices
11. Provide access to well-trained, quality coaches
12. Provide access to high-quality facilities
Timing and Monitoring of Specialization
13. Discuss sports goals with the youth athlete
14. Encourage participation in multisport
15. Monitor athlete well-being

## METHODS

We consulted a panel of sports medicine experts in AMSSM to identify which team and individual sports and sport organizations would be included in the review. We encompassed organizations in major Western countries and guidelines published in English. These countries were the United States, Canada, England, Germany, Spain, Italy, Sweden, and Australia. Team sports included soccer (also referred to as the sport of football in other countries) and basketball because of their level of international popularity. We also selected ice hockey because of the availability of materials for review by a

variety of governing bodies and sports organizations. For individual sports, we considered tennis, gymnastics, and swimming. We found limited resources on guidelines for tennis participation outside the United States, while gymnastic guidelines were primarily from non-English speaking countries and could not be translated effectively. Therefore, swimming was the only individual sport included.

We then conducted searches for documents regarding youth sport specialization and athlete development from individual country Olympic committees, international major league organizations, and individual country governing bodies relevant to the selected sports. We also reviewed sport specialization and athlete development documents from domestic and international sport and youth organizations to identify positions or recommendations (Appendix Table A1, available in the online version of this article). Certain groups were considered for inclusion because of their missions and involvement in steering youth sports recommendations. However, they were excluded in the analysis because they lacked specific recommendations on the sports selected. We used ADM and LTAD for sports that had published recommendations and were available in English.

Additionally, we reviewed athlete development plans and coach education materials that discussed aspects of sport participation including ages, training volume, and other recommendations that are relevant to the topic of youth sport specialization. From these documents we extracted the following information: governing body or organization, sport (if applicable), country of origin, level of participation for which the document was intended, type of statement, type of model used in the statement, recommended competition level by age, training and competition volume recommendations, and recommendations for managing specialization or athlete development (Appendix Table A2, available online). The extracted data were reviewed and categorized using the previously defined Criteria for Recommendations on Youth Sport Participation.<sup>9</sup> The documents were reviewed independently by 2 authors, and disagreements were adjudicated by a third author.

## RESULTS

### Organizations

The 5 organizations that provided general recommendations on sport specialization were United States-based. These included sport governing bodies of the USOC/National Collegiate Athletic Association,<sup>37</sup> US Olympics/Paralympics,<sup>38</sup> and other groups, including the Aspen Institute,<sup>1</sup> SHAPE,<sup>28</sup> and Mom's team.<sup>23</sup> There was consensus on the importance of skills development, quality coaching, and encouraging of multisport participation. Recommendations that followed an ADM contained the greatest number of elements from the 4 thematic categories. No organization explicitly outlined recommendations to monitor athlete well-being.

### Summary of Findings for Soccer

Recommendations for youth sport development were identified from Australia Soccer,<sup>7</sup> Canada Soccer,<sup>4</sup> England Soccer/Premier League,<sup>27</sup> FIFA (Fédération Internationale de Football Association),<sup>6</sup> Germany Soccer,<sup>8</sup> Italy Soccer,<sup>12</sup> and USA Soccer<sup>39</sup> (Appendix Table A2, available online). Recommendations were primarily focused on the Psychological Development/Approach and Physical Development/Load categories. Early skill development and access to quality coaches at all levels were most commonly recommended. No organizations explicitly advised against youth sport specialization or included recommendations for multisport participation.

For organizations that included age-based recommendations, the age range for competing at the local level was 0 to 12 years, at the regional level was 9 to 21 years, and at the national level was 12 to 21 years. Canada Soccer, England Soccer/Premier League, and USA Soccer provided age-based volume recommendations (Appendix Table A3, available online). In general, training volume increased with age; however, there were inconsistencies in the recommended ranges.

### Summary of Findings for Basketball

Recommendations for youth sports development were identified from Australia Basketball,<sup>22</sup> Canada Basketball,<sup>3</sup> National Basketball Association (NBA),<sup>34</sup> and USA Basketball<sup>35</sup> (Appendix Table A2, available online). Most organizations utilized LTADs. Recommendations consistent across organizations included broad definitions of sports success, early skill development, an emphasis on quality coaching, and recommendations for multisport participation. In contrast to soccer, recommended ages for competition level were not included and only NBA/USA Basketball provided youth volume recommendations (Appendix Table A4, available online).

### Summary of Findings for Ice Hockey

Recommendations for youth sport development were identified from Australia Hockey,<sup>11</sup> Canada Hockey,<sup>10</sup> and USA Hockey<sup>30</sup> (Appendix Table A1, available online). Most organizations utilized LTADs. Recommendations consistent across organizations included broad definition of sports success, early skill development, emphasis on quality coaching, and recommendations for multisport participation. Injury prevention was included in USA Hockey but not explicitly identified in Australia and Canada LTAD. Age range for type of competition varied greatly. When available, recommendations for training volumes increased with age (Appendix Table A5, available online).

### Summary of Findings for Swimming

Recommendations for USA Swimming,<sup>36</sup> Swim England,<sup>29</sup> Swimming Canada,<sup>31</sup> and Swimming Australia<sup>35</sup> are listed in Appendix Table A1 (available online). Most organizations used LTADs. General consensus was observed across organizations to

identify talent, instill passion for activity/sport, promote safety and health, and nurture psychological development and well-being. Most included recommendations for creating a broad definition of sports success. The Physical Development/Load domain was emphasized by most organizations. Compared with team-based sports, less emphasis was placed on facilities and resources, including quality coaching. Similar to basketball, multisport participation was generally encouraged.

Two organizations (Canada and Australia) presented ages for competition. The recommended age range for competing at the local level was 4 to 16 years, at the regional level was 9 to 16 years, and at the national level was 12 to 16 years. Volume recommendations were made by Swimming Canada and followed a graduated level of total frequency and volume by age (Appendix Table A6, available online).

## DISCUSSION

There were similarities and differences with recommendations that have been previously noted in a companion systematic review of recommendations.<sup>9</sup> A discussion of these trends, similarities, and contrasts in recommendations organized by domain follows.

### Psychological Development/Approach

Guidelines on youth sport specialization from governing bodies all emphasize the benefit of psychological development. General consensus exists to promote sports participation across the life span for overall health and wellness. The focus on skills development and milestones over competition at younger ages was commonly encouraged. Early focus on winning and playing above skill level with older athletes may result in maladaptive behaviors that do not contribute to development. Athlete development should help cultivate future talent and ensure that youth sports participation also provides an avenue to continue to enjoy sports into adulthood. In contrast to sport organizations, proposed solutions by governing bodies included creating experiences outside of the elite sports ladder to provide alternative opportunities for sports enjoyment.<sup>4</sup>

### Physical Development/Load

A focus on skill development was commonly identified across governing bodies. Variations in maturation may result in differences in performance later in adolescence. Age guidelines, which are central to the LTAD and ADM frameworks, were commonly proposed to guide participation, though they were recognized as inadequate by some organizations. For example, in hockey, athletes born July to December were less likely to remain in the sport compared with those born January to June.<sup>2,11,30</sup> Experts in hockey, in general, discourage the concept of “playing up”<sup>19</sup> and the LTADs across sports evaluated focus on skill development at younger ages. However, other strategies to address inherent differences in rate of physical and psychosocial maturity for a given age require further study.

Numerous sports organizations provide guidelines for participation that vary in duration, frequency, and total time for participation (by session or total weekly in minutes). The observed range in participation by age may reflect that sport governing bodies want to account for differences in physical maturity within an age range, thereby limiting the standardization of recommendations. The variance and inconsistency within a sport may also reflect the limited evidence to inform guidelines on safe participation. To advance understanding for optimal participation, sport governing bodies would benefit from developing consensus for appropriate volumes of participation, applying these recommendations consistently, and tracking measurable outcomes to determine effect on health and participation status. Sport organizations and sport governing bodies also differed in their recommendations on conditioning and injury prevention programs. A majority of sport governing bodies recommended injury prevention programs; however, these were not referenced in sport organizations. While differences are unknown, one potential explanation is that sport governing bodies have recognized specific concerns within their sport that created organizational momentum to develop injury prevention programs. For example, the high rate of overall injuries in soccer resulted in FIFA’s<sup>6</sup> creating the FIFA Medical Assessment and Research Center in 2004.<sup>15</sup> The resulting FIFA-11 lower extremity program was developed and found to reduce rates of injury.<sup>15</sup> The program has been modified to FIFA-11+, which may be more effective for injury prevention.<sup>32</sup>

### Facilities and Resources

The most common resource identified across sport organization guidelines and within individual sports was the importance of parent education and quality coaches. However, metrics to evaluate what constitutes “well-trained” coaches or a “high-quality” facility were not provided. Coach and parent education may counteract a commonly cited concern in commercialization of youth sports that it creates incentives that oppose the best interests of youth athletes. The evidence presented by sport organizations and governing bodies does not support value in youth sport specialization with limited exception. Mechanisms to educate key stakeholders, including both parents and coaches, may protect youth athletes. Future research may include evaluating education programs for both parents and coaches to change behaviors and the culture of youth sports.

### Timing and Monitoring of Specialization

Concerns for youth sport specialization were commonly cited in organization statements of youth sports. These include risk for adverse psychological outcomes, burnout, and injury.<sup>1,23,28</sup> Within sport governing bodies, however, recommendations for multisport participation at younger ages were not uniform. Both basketball- and ice hockey-specific recommendations cited the value in early sports sampling to develop fundamental skills that would translate to sport success at older levels. Notably, ice hockey is a collision/contact sport where differences in physical

development could influence ability to perform activities, such as checking at younger ages. Adolescence was a commonly offered recommendation for when to consider potential sport specialization, although specific ages or metrics for maturity were not defined. In contrast, soccer did not explicitly recommend multisport participation. Understanding recommendations and beliefs within a sport may require further investigation, including communication with governing bodies and further sport-specific research to identify benefits to multisport participation in youth athletes who specialize later.

The importance of monitoring athlete well-being and discussing sports goals of the youth athlete was commonly mentioned by sport organizations but not cited within specific guidelines.<sup>38</sup> Sport organizations may value these principles but did not document specific mechanisms to evaluate fatigue and burnout. With the growth of youth sport specialization, identifying mechanisms to monitor athlete well-being, including athlete-specific goals, may help address concerns for burnout in youth sports.

### Future Development of Recommendations

In the process of these reviews, we identified themes and inconsistencies. We propose the following standards that should be incorporated into future recommendations to help athletic communities and medical providers understand those recommendations, have more confidence in the recommendations, and make them increasingly actionable.

*Recommendations should be specific:* Guidelines should attempt to provide specific information regarding appropriate levels of participation. Terms such as “high-quality facilities” may be open to interpretation and should be defined by context and level of play. For example, a grass field in a safe environment may be sufficient for youth soccer to play 5-on-5; larger playing surfaces with markings and regulation size goals may be required for older players and advanced styles of play. Making a given recommendation clear and actionable is important to change behaviors and educate the athlete and key stakeholders.

*Recommendations should be consistent:* Recommendations for youth sports should follow consistent guidelines to avoid ambiguity. Differences between sports governing bodies and sports organizations highlight limitations in a consistent measure of training load. The full breadth of information needed to monitor an athlete’s participation includes the number of sessions per week, duration of each session, length of a season, and the number of rest periods within a week and during the year. Recommendations for training loads and specialization may be best in the context of specific ages as opposed to maturation because of varying ages of puberty and difficulty in consistently measuring maturation status. We recognize that an individual athlete will have variable levels of mental, emotional, and physical maturation at a

given age; however, the advantage of using age or other easily defined and measurable metrics may be in the ability for information to be translated and implemented at the community level. Maturation can then be used to contextualize decisions on training load and specialization within specific age ranges, as some of the reviewed guidelines noted.

*Recommendations require coordination between health organizations and sport organizations and governing bodies:* The common goal in youth sports participation should be to facilitate long-term participation and enjoyment in physical activity. Health organizations and the sport organizations and governing bodies in this review have overlapping areas of agreement on many items within the framework developed across the 2 reviews.<sup>9</sup> Many goals are not mutually exclusive; developing appropriate guidelines that address stages for an athlete during growth and development, provide appropriate training, and guide timing for specialization allow the athletes to reach their full potential and to enjoy sport.

### Limitations

The review has several limitations. The framework to evaluate aspects of youth sport specialization is prone to interpretation of available published guidelines. However, recognizing common areas of agreement and those concepts without consensus may guide further discussions aimed at contributing to health and well-being of the youth sports participation, including methods to advance athlete development models and guidelines for major medical/advocacy groups. We developed the 15 categories to characterize common elements of youth sports literature; these are not validated metrics that have been evaluated to predict outcomes from youth sport specialization. Grading recommendations from sport-specific organizations was based on review of available published literature and is subject to interpretation in determining how content meets each category.

This sport-specific review was conducted and focused on 3 team-based sports and the individual sport of swimming; sports may have unique considerations. Figure skating, gymnastics, and diving are sports where peak performance may be achieved at a young age<sup>18</sup>; benefits for youth sport specialization have not been documented in other individual-based sports.

Similar trends to those observed with the publications from the systematic review are seen in the results of this narrative review.<sup>9</sup> Within the different recommendation categories, there is a general lack of specificity regarding the definitions of different concepts, such as “well-trained” coaches. Similarly, while several organizations noted the need to account for the maturation level of the athlete for training and development, specific training volume guidelines were provided by age alone. Early diversification of sports participation with late specialization was also a commonly offered guideline, but without any specific definitions on the timing of “early” and “late.”

In contrast to the results of the systematic review, the sports organization materials reviewed here provided a higher degree of specificity regarding when different levels of competition were appropriate and the amount of training that should be considered for athletes across ages. However, in those cases where multiple sources provided such guidelines, there was a lack of agreement between different sports organizations both in terms of the magnitude of training at a given age and in how to express the amount of training.

## CONCLUSION

Current youth sport participation guidelines vary greatly both within and between sports. There is a lack of consensus over how youth athletes should train and other aspects of participation, which may be contributing to the youth sport specialization problem. The domains described here can be used as a framework for important concepts for organizations to consider when developing youth sport participation guidelines.

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