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The effects of early sport specialization (ESS) on youth sports: Benefits and issues

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Abstract

Early sport specialization (ESS) refers to intense, year-round training and competition in a single sport at the exclusion of others. In recent years, the phenomenon of ESS has become more common within youth sport, in part due to a belief that ESS will lead to greater achievement in a specific sport. However, for sports in which the age of peak performance occurs during adulthood, such as all the major American team sports, evidence suggests that ESS is not a requirement to reach elite status. Additionally, ESS may be related to higher risks of burnout and overuse injuries in children due to the increased amounts of deliberate practice and repetitive stress children are exposed to. The risk of injury to an athlete that specializes early may also persist later into that individual's athletic career. Early sport sampling is an alternative strategy to ESS in which children are encouraged to sample a wider number of sports, and it may be a more developmentally appropriate approach. Furthermore, early sport sampling may lead to greater enjoyment of physical activity and engagement in sport later in life. More research is needed on the topic of ESS and the growing trend in youth sport; however, current evidence suggests that the risks of ESS do not exceed the benefits. Therefore, the purpose of this paper was to review the effects of ESS on youth sports and discuss ways to avoid the negative effects on the physical and psychosocial development of children.

Keywords: Burnout, early sport specialization, motor development, youth sports, physical

1. Introduction

Organized youth sport plays an important role in providing opportunities for children and adolescents to participate in physical activity. In the United States, it has been estimated that nearly 60 million youths between the ages of 6 and 18 participate in organized sports and approximately 27 million play team sports ^[1]. The reasons why parents have their child's participate in organized sport can vary. For example, parents want them to learn leadership, sportsmanship and teamwork to earning a college scholarship ^[2]. There is evidence that more children begin training and start competing in a single sport at an earlier age ^[3]. This phenomenon, termed early sport specialization (ESS), refers to intense, year-round training in one sport at the exclusion of others ^[4]. Although many athletes end up specializing in one sport eventually, the phenomenon of ESS refers to sport specialization that occurs in childhood and early adolescents. The reason why more children are specializing in one sport is unclear, however, it can be related to a desire by parents and youth athletes to reach a high level of performance in a certain sport ^[3]. The alternative to ESS is early sport sampling. It involves participation in multiple different sports and activities in an effort to diversify the youth athlete's experience in sport and aid in their physical and motor development. Early sport sampling is considered as a more developmentally appropriate model than ESS ^[5]. Physical activity is an effective way to reduce the risk of childhood obesity as well as cardiovascular disease and metabolic syndrome later in life ^[6]. Increased physical activity in children can also improve cognitive function and reduce the risk of depression through improvements to self-perception ^[6]. Furthermore, physical activity offers important opportunities for socialization through developing the skills of teamwork, problem solving, and sportsmanship ^[6]. Organized youth sport offers an important outlet for children to engage in physical activity. However, some may see youth sports participation only as a means to achieve elite levels of sport skill, rather than also as an opportunity for children to engage in physical activity and learn important life skills. The growing financial success and recognition of professional athletes

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may have also increased the appeal of reaching elite status in a specific sport [4]. Regardless of this factor, organized youth sports can be an important way to give children the opportunity to receive the benefits of physical activity. The trend of ESS in youth sport may be due, in part, to the Olympic successes of Eastern European communist countries and media coverage of the early ages that many of their athletes began intensive trainings [3]. This has been coupled with loose interpretations of research showing the importance of deliberate practice and the “10,000-hour rule” in the attainment of expertise [7]. Deliberate practice is undoubtedly an important way to develop expertise in any skill [8, 9]; however, when and how this type of practice should be applied for the attainment of sport skill is not clear and may be dependent on the age of peak performance in the sport [10]. The number of children aged 6 or younger that are participating in team sport has increased, as well as the number of travel leagues for 7- to 8-year-olds [4]. Furthermore, a majority of high school athletic directors report a trend of more sport specialization [4]. This is in spite of the fact that less than 10% of high school athletes play collegiate sports, and between 0.03% and 0.5% of high school athletes go on to play professionally [6]. Additionally, less than 1% of athletes between the ages of 6 and 17 will reach elite status in a major American sport [4]. This serves to demonstrate the disconnect between the goals of athletes to reach an elite status and the reality of the likelihood of attaining that level of performance. Considering the growing trend of ESS, many have expressed concerns over potential negative effects of ESS and called into question its appropriateness in attaining sport skill expertise [10]. Therefore, the purpose of this paper was to review effects of ESS on youth sports and discuss ways to avoid the negative effects on physical and psychosocial development for children.

2. Positive effect of early sport specialization

There are some parents believing that ESS is required to improve their child's skills and technicians in the sport they are specializing in. Goodway and Robinson [10] suggested that there are two primary assumptions of ESS. The first assumption is that a greater amount of deliberate practice of a skill will lead to higher levels of skill in adolescence and adulthood. Secondly, engaging in ESS assumes that experts and non-experts of a specific sport can be differentiated by the amount of deliberate practice they undertake to get to that point. Deliberate practice is characterized by training from a qualified teacher on tasks that are specific to the skill that is being attained [8]. There is some evidence that the accumulated amount of deliberate practice an individual engages in is important for reaching elite status in a sport; however, the age that athletes begin engaging in this type of practice may be highly dependent on the sport [9]. This would appear to support the second assumption of ESS, but the evidence is limited. It is unclear if the first assumption of ESS, that greater amounts of deliberate practice during childhood lead to greater skill during adolescence and adulthood, is true. Popkin *et al.* [3] mentioned that athletes at the high school level specialize earlier than professional or collegiate athletes [3]. This would appear to contradict the first assumption of ESS. A major limitation of the research on this topic is that these studies are retrospective in nature. Regardless, for sports in which the age of peak performance is older, findings consistently show that elite athletes typically begin intense, specialized training for their given sport later than non-elite athletes [3].

ESS is partially defined by intense training in a single sport and is therefore believed to give children a greater amount of deliberate practice. The alternative to deliberate practice is deliberate play, which is characterized by an intentional and voluntary engagement in informal sport games [5]. Deliberate play is typically associated with sport sampling. The Developmental Model of Sport Participation (DMSP) acknowledges that ESS and early sport sampling differ in how they balance deliberate play and deliberate practice [11]. Côté *et al.* [5] argues that early sport sampling is a more developmentally appropriate strategy for youth sport participation since it prioritizes deliberate play, which may enable healthier physical and psychosocial development in that it offers a greater variety of opportunities for motor skill development and socialization. Furthermore, deliberate play may build greater intrinsic motivation and enjoyment in sport and physical activity which could increase the likelihood of engaging in deliberate practice later in life [5].

Limited research has examined the effects of ESS on fitness, movement skill, and coordination in pre-pubertal and post-pubertal athletes. Root *et al.* [12] investigated how different levels of specialization in youth gymnasts (age 10.9 ± 2.9 years) relates to fitness and proficiency at functional-movement tasks. They used pre-season fitness and movement screen data from 131 youth athletes participating in club-level gymnastics and categorized athletes into three different levels of specialization (low, moderate, and high). Although they did not directly assess gymnastics skills, the fitness and movement tests that were used were specific to many of the demands of the sport. Not surprisingly, they observed that a majority of the youth gymnasts were moderately or highly specialized, with only 14.5% falling into the category of low specialization. There was no difference in the fitness task performance between the three different levels of specialization, and low specializers only performed significantly worse on part of one of the movement skill tests when compared to moderate and high specializers. These results provide evidence that ESS may not improve fitness or movement skill to a greater extent than early sport sampling as there were few differences between the three levels of specializers. Similarly, DiCesare *et al.* [13] examined biomechanical differences in landing and jumping between adolescent female athletes that specialized in a single sport and those that played multiple sports. The participants that were specialized in one sport showed more variability in coordination of the hip and knee joints during landing than the multi-sport participants. It is important that athletes are proficient at performing jumping and landing tasks in a safe manner considering the prevalence of knee injuries in female athletes [14]. Thus, the findings present a potential detrimental effect of ESS in developing jumping and landing skills in young female athletes [13].

3. Negative Effects of Early Sport Specialization

3.1 Burnout and Dropout

Due to the intense training that accompanies sport specialization, there is a fear that ESS may lead to greater rates of burnout and dropout from sport or physical activity later in life. Burnout in youth athletes may lead to symptoms of fatigue, difficulty completing usual routines, or lack of enthusiasm about participating in a given sport [15]. These symptoms can develop over time as the athlete experiences varying psychological responses to being placed in a situation with varying demands that are perceived as excessive [16]. There is some evidence that adolescent sport specializers

experience higher levels of burnout than sport samplers [18]. Whether this also applies to athletes that specialize before adolescents is unclear. Nevertheless, parents and youth sports coaches should be aware of the environmental and personality factors that can lead to burnout. Environmental factors can include extremely high training volume, extremely high time demands, high performance expectations, frequent and intense competition, inconsistent coaching practices, lack of autonomy over sport decision making, and negative performance evaluations [16]. Personality traits associated with burnout are perfectionism, a need to please others, non-assertiveness, unidimensional self-conceptualization, low self-esteem, and high perception of stress [16]. Burnout can lead to withdrawal or dropout from the sport that caused it. It is, however, important to note that many athletes drop out from sport due to other time commitments and not from experiencing burnout [16]. It has been observed that sport participation in adolescence and early adulthood is strongly associated with levels of physical activity during adolescence and early adulthood [17]. Furthermore, remaining in sport to the age of 16 may increase the likelihood of remaining physically active in early adulthood [17]. This highlights the importance of sports participation in childhood and adolescence as a means to promote healthier levels of physical activity in adulthood. It is possible that dropout from sport in childhood or early adolescence could lead to disengagement from physical activity later in life, however, empirical evidence for this is limited. Gallant *et al.* [19] investigated the sport participation patterns of sport samplers and specializers from late childhood to adolescence. They observed the levels of free-time physical activity between early sport specializers, early sport samplers, and sport nonparticipants. They found that both early sport samplers and specializers were less likely to be sport nonparticipants in adolescence; however, after the fourth and fifth year of the study they found that early sport specializers had the same likelihood of becoming sport nonparticipants as children that entered the study as sport nonparticipants. These findings appear to show that early sport sampling may lead to adolescents staying more engaged in sport throughout this time in their life. Russell and Limle [20] conducted a study to explore the relationship between youth sport experience and adult perceptions in terms of participation in sport and physical activity. One hundred fifty three young adults (18 to 22 years old) were surveyed on whether they specialized in single sport as a youth (before the age of 14), their current sport and physical activity participation, and their retrospective perceptions of their youth sport experience. Only 21.6% of participants were still competitive participants of a sport they played during their youth with 43.1% participating recreationally. No differences were observed between the different levels of ESS and current levels of physical activity enjoyment, or between ESS and the current frequency of aerobic and strength training. Furthermore, there were no differences in the retrospective perceptions of youth sport experience between those that specialized and those that did not [20]. There was, however, a lower likelihood that individuals that specialized in a single sport as a child participated in sports as an adult when compared to those that were multi-sport youth athletes. Additionally, greater positive perceptions of youth sport experience were related to greater enjoyment in physical activity as an adult. Although these findings do not support the notion that ESS and dropout from sport lead to lower levels of physical activity in adulthood, they do show that early sport sampling may lead to continued

engagement in recreational and competitive sport later in life and that a positive youth sport experience can lead to greater enjoyment of physical activity in adulthood.

3.2 Psychosocial Outcomes

There is concern that ESS can negatively affect other psychosocial outcomes outside of those related to burnout. Retrospective analysis of psychological health outcomes of young adults has shown that ESS is associated with emotional and physical exhaustion, a motivation, and sport devaluation in childhood [21]. However, ESS may not negatively affect measures of psychological well-being in adulthood [21]. Furthermore, Dahab *et al.* [23] observed no differences between low, medium, and high adolescent sport specializers and measures of quality of life. These findings suggest that adolescent athletes may be developed enough, both cognitively and psychologically, to handle the demands of sport specialization. Conversely, McFadden *et al.* [22] used basic needs theory, a sub-theory of self-determination theory, to examine the psychological functioning of adolescent hockey players. Basic needs theory posits that the ability to make choices, need to feel a sense of mastery, and need to feel a sense of belonging are important for personal, social, and psychological development and well-being. The extent to which these are met is termed needs satisfaction. McFadden *et al.* [22] found that mean psychological needs dissatisfaction for early specializers in hockey was significantly greater than for late specializers and recreational players. Thus, it is likely that a certain level of psychological and social development is required before youth athletes can specialize without experiencing negative psychosocial outcomes.

3.3 Early sport specialization and injury

Overuse injuries are common within youth sports and it is feared that ESS may increase the likelihood of youth athletes experiencing these types of injuries [1]. This increased risk may be caused by greater practice and competition demands of early sport specializers when compared to children that participate in sports recreationally [10]. Specifically, ESS may expose youth athletes to training that is not developmentally appropriate for the age of those athletes, while also not providing adequate rest and recovery [10]. Overuse injuries in youth are often a product of repeated stresses to muscles, ligaments, bones, and tendons that are not fully developed [1]. There is lots of attention on certain sports like baseball, gymnastics, hockey, and swimming that provide year-round options for youth athletes to compete in as this increases the risk of developing an overuse injury [1]. It is important that youth athletes engage in training, practice, and competition that is developmentally aligned with what their bodies can withstand and recover from in order to reduce the risk of overuse injury. ESS also have long-term effects on injury risk. Dahab *et al.* [23] found that high school athletes that participated in a club sport outside of their high school reported a higher number of musculoskeletal injuries than those that did not. Ahlquist *et al.* [24] investigated the relationship between sport specialization and prior injury history in NCAA Division I athletes (20.1 ± 1.4 years old). Collegiate athletes classified as having been early sport specializers were more likely to report a history of injury, multiple injuries, multiple college injuries, a greater number of total injuries, and more time lost due to injury than others. Notably, athletes that specialized after the age of 15 did not report the same level of injury history. Increased injury risk caused by ESS was not fully explained by differences in

overall training volume as a youth. Ahlquist *et al.* [24] found that ESS was associated with a greater likelihood of reporting a history of injury and greater number of total injuries for early specializers that had both high and moderate levels of training volume during their youth. This finding may be a result of early sport samplers being exposed to less repetitive stress in the greater variety of movements of the different sports they played. These findings are in agreement with previous study exploring collegiate wrestlers that specialized before the age of 12 reported a significantly greater number of major injuries before college than those that specialized after age 12 [25]. However, these findings on ESS and injury history in collegiate wrestlers showed that early specializers were at no greater risk of sustaining an injury in college [25]. Exposing youth athletes to the repetitive demands of sport specialization while they are still physically developing may lead to structural changes that could affect their athletic health later in their career. Sheppard *et al.* [26] found that collegiate hockey players that were classified as high and moderate specializers before high school were at a greater risk of hip and groin dysfunction than low specializers. These results were more pronounced in female hockey players that were highly specialized in the sport before high school. Although injury risk may be highly dependent on the demands of the sport, it is important to consider that introducing intense, specialized training in one sport before a child is physically ready may have long lasting effects on their physical development and subsequent injury history. We conclude our finding to with object of your studies.

4. Conclusion

ESS is a growing trend because of parents' and youth athletes' desires to reach elite levels of sport performance. Despite of this factor, it is unlikely that ESS is a requirement for reaching these elite levels of sport. Furthermore, ESS may not be a developmentally appropriate model of youth sport participation as it may carry with it certain risks and health concerns. There has been limited research that explore a child's risk of experiencing burnout and other negative psychosocial outcomes because of ESS. Additionally, ESS may exacerbate the risk of youth athletes developing overuse injuries. Although ESS may increase the amount of deliberate practice a youth athlete receives, the DMSP, which prioritizes early sport sampling, may be more developmentally appropriate for youth athletes. Empirical evidence of the risks and benefits of ESS is limited. A majority of studies in this area rely on cross-sectional retrospective survey data to identify the effects of ESS. Furthermore, much of the research on ESS is limited to certain sports like gymnastics, swimming, or baseball. Future research in this area should utilize longitudinal prospective research designs in order to better understand the positive and negative effects of ESS.

5. Practical recommendations

For sports where the age of peak performance occurs during adulthood, it is unlikely that ESS significantly increases a child's chance of reaching an elite level, and early sport sampling may be a more developmentally appropriate strategy [5]. Early sports participation should be focused on building general athleticism and motor skills before more sport-specific skills are developed and trained [6]. Coaches and parents should keep workouts fun and engaging by including age appropriate games and training to reduce the likelihood of athletes experiencing burnout [15]. Children should have time off during the week and longer breaks of two to three months

from training and competition in a specific sport can also reduce the likelihood of burnout [15]. Furthermore, the total number of hours of training per week should not exceed the age of the child [6]. For athletes that do specialize, coaches and parents should encourage them to cross-train in different sports and take time away from the structured training and competition of their preferred sport [6]. It is important to be aware of the negative effects ESS can have on youth athletes and monitor children for any of those signs [6]. Goodway and Robinson [10] provide a useful framework for parents on when and how to navigate their child's sports participation. They recommend that during the early childhood years from ages 3 to 7, parents should focus on providing opportunities for their child to develop proficiency in fundamental motor skills (FMS) through non-sport-specific means. From ages 7 to 11 it is encouraged that children sample many sports while they are still becoming competent in FMS. It is suggested that between the ages of 11 and 13 athletes can either continue sport sampling and recreational sports participation or begin to increase sport specialization and deliberate practice. Athletes can continue on either of these two separate trajectories through high school as they become physically, cognitively, socially, and psychologically developed enough to handle the demands of intense specialized training.

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