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Early Sport Specialization and Its Negative Effects Compared to Sport Sampling

Introduction

Athletics are a pastime that people of all ages associate with their childhood years. Children typically participate recreationally in sports or simply just involve themselves in certain types of play with other kids. Play and physical activity is a critical part of the fundamental stage of athletic development for children.^{1,2} Interestingly enough, Ferguson et al points out that today's youth is generally less active, yet activity in organized sports is on the rise in the United States. He also points out how in 1987 children six years old and younger made up only 9% of the youth athletic population involved in organized sports whereas in 2008 children six years and younger made up 14% of the youth athletic population involved in organized sports.¹ This is just one statistic that demonstrates how more children are entering the world of intense organized sporting activities at younger ages. Encouraging youth participation in sports is a great way to aid in not only motor development, but also psychological and social development of a child in the years leading up to adolescence. This is a critical developmental period in which involvement in athletics can have a significant impact. Recently though, a trend has emerged where young children are specializing in one particular sport as opposed to being involved in a multitude of recreational activities. This has come to be known as early sport specialization (ESS). Though there is not one concrete definition of what ESS is, most agree that it can be

described as an intense, year-round training program that focuses on one specific sport from a young age, at the exclusion of all other sports.^{1,2,3} Some qualities that are indicative of ESS are high training volume, minimal time off, and the goal of attaining an elite/professional status, just to name a few.^{1,2}

On the other hand, many children actively participate in multiple sports throughout the year. Many people advocate for this mode of physical activity throughout childhood. This is often termed sport sampling. Sport sampling is simply having young athletes be involved in a diversified array of sports as opposed to homing in on just one. When children participate in diversified activities it allows them to develop the necessary neuromuscular skills that work to ensure injury prevention, which is one of the biggest risks associated with ESS. It also allows children to develop diverse and comprehensive motor skills that cannot all be attained by specializing in one sport alone.^{3,4,2} Some people argue that sport sampling could also lead to high risk of injury due to equal amount of training volume that could be seen in ESS. While injury is possible, those injuries attained by sport sampling aren't nearly as life altering or detrimental to an athlete's career.⁵

The debate between ESS and sport sampling though doesn't end with the physical and developmental aspects. Psychological processing is a very important component of this issue. ESS has raised some concerns revolving around player burnout, depression, and withdrawal from sports as a whole.³ Myer et al states that pressures are brought onto children at such a young age to strive for collegiate scholarships and to achieve professional status and the fame that comes along with it. This psychological stress contributes to feelings of constant pressure,

increased stress, feeling a lack of control of one's own life, and lacking decision making abilities.³

There are also some social implications of ESS. One of the biggest social issues to tackle with ESS is the parent, coach, and occasional trainer influence. Parents are the strongest initiators of participation in sport for youth athletes.¹ Once parents are made aware of the talent their child possesses and, realistically, the slight chance that their child could reach a professional status in sports, the pressures they create become a pressing issue. Coaches too, are often some of the first people to recognize talent in youth athletes. Their pushing and encouragement to devote more time to the sport becomes a driving factor in ESS. Sport sampling also gives children a greater opportunity to gain exposure to prosocial norms. Being exposed to multiple environments by participating in multiple sports allows for reinforcement of good social behavior.⁶ Sport sampling raises the concern by some though, that the level of coaching received will not be up to par and therefore cause the athletes performance to suffer.⁵

Both ESS and sport sampling come with their equal sets of debatable claims. Ultimately though, sports sampling is a safer and more effective means of involving America's youth in sports. Early sport specialization can be detrimental to the overall health and well-being of children, therefore sport sampling should be considered when involving children in organized sports.

Early Sport Specialization

What is ESS?

Early sport specialization is a relatively new phenomenon and concept in the world of athletics and sports medicine. This trend has exponentially caught attention over the last ten or so years, more specifically, the literature on this topic has boomed in that time frame. This directly emphasizes how important the topic of ESS currently is in the field of sports medicine. It is a controversial topic that has a decent amount of conclusive evidence but is still very much a new and debatable concept for most people. Since new research is still being conducted on ESS, the “definition” is constantly being altered and modified. Currently, though, most are in agreement with the idea that ESS is considered to be an intense, year-round training program that focuses on one specific sport from a young age, at the exclusion of all other sports.^{1,3} This definition allows for some degree of variability on how intense the specialization can be.³ There are three variables that can help determine the intensity (low, moderate, and high) of the specialization. The first variable is the initial decision to choose one sport to be considered your main sport. The second is whether or not you participate for more than 8 months throughout the year in that main sport. And the final determinant is the act of quitting all other sports.³ If a young athlete meets all three of these criteria they are considered to be at a high risk of injury and a high risk of serious overuse injury.³ Some factors that have been found to prompt youth specialization include the idea that when you specialize you receive better coaching, the fear of falling behind competitively, parental expectations, pressure from coaches and college recruiters, and the desire to participate in championship level competitions.² ESS initially provides children with the determination and drive to achieve goals like participating in championship level competitions and being recognized as “the best”. Children tend to be very

egocentric, so recognition for being good at something can sometimes be appealing to children.⁷

The impetus to increase time practicing/ playing a single sport came from an article written by Ericsson et al, that was misinterpreted by its readers. In his article, Ericsson et al focused on factors that would help to predict expert performance.^{1,6} First and foremost, it is important to note that the study conducted by Ericsson et al was performed on musicians to see what they needed to do in order to achieve an expert status.^{1,6} Ericsson et al suggested that starting deliberate skill based practice in large volumes at a very young age was indicative of becoming an expert performer.^{1,6} This article enforced the well known “10,000 hour rule” which encouraged large volumes of practice.^{1,6} The conclusions drawn by Ericsson et al quickly made their way into the world of athletics and mislead people to believe the ideology of high volumes of intense work at a very young age was the key to success, whether that be a college scholarship or professional rank. Meanwhile with the subjects of the study being musicians, there cannot logically be any definitive carry over of the conclusion Ericsson et al drew into athletics.

It is important to note that ESS doesn't apply to all sports. ESS tends to center itself around the age at which peak performance occurs within a given sport. For example, ESS is not commonly applicable to baseball (with the exception of pitchers). Baseball players peak in performance later on in life as seen in the pros where a majority of the players range in age from early to mid 20s to mid to late 30s.¹ Therefore, there should be no reason for a seven-year-old boy to be practicing six days a week on top of games and averaging 90 to 100 pitches a game, yet it is being seen more and more often in today's youth. This could very well cause

some sort of potentially career ending overuse injury at a young age. On the other hand, for a sport like gymnastics ESS does apply.¹ In gymnastics it is advantageous to be small and light. Therefore, in order to be successful girls need to start training before they reach their peak height velocity (PHV). PHV normally occurs shortly after a girl goes through puberty so scientifically it makes the most sense that girls start training very young in order to optimize skill development.

Sport Sampling

What is Sport Sampling?

The alternative then to ESS is sport sampling. Although it sounds technical, sport sampling is likely what most people experienced throughout childhood. Simply playing street sports just to engage in physical activity allows for sport diversification while growing up. Sport sampling is defined as engaging in a variety of sports throughout childhood and the formative youth sport years with the fundamental goal of learning skills and having fun.^{6,8} One of the other chief differences between ESS and sport sampling is its intention. Sport sampling is characterized more by deliberate play rather than deliberate practice.⁶ Côté et al describes deliberate play as youth athletes participating in activities because of the fact that they are inherently enjoyable to the child and because they help in developing athletic skills.⁶ Sport sampling also correlates nicely with the physical literacy window which is known for being between ages six to twelve. Physical literacy is the physical competence, knowledge and understanding of the value of engaging in physical activity throughout the lifespan.⁹ It is during the age range of six to twelve years that all children in general are developing competence in

fundamental motor skills.⁸ In youth athletes especially, these fundamental motor skills are being tested, used, and developed in a variety of sports and other forms of physical activity.⁸ Goodwin and Robinson state that “the goal during these sampling years is the acquisition of proficient performance in fundamental motor skills, the development of high perceptions of competence, and engagement in a diversity of sports so that children can begin to determine the next pathway in their youth sport trajectory”.⁸

How is Sport Sampling Better?

Goodwin and Robinson also describe how aspects of ESS like the high training volume and high intensity of activity don't necessarily differentiate between elite and nonelite athletes.⁸ Further, they concluded that since there is no differentiation, that sport sampling should be adopted due to its broad array of benefits; it creates a base for fundamental motor skill development that should be learned first before children make the decision of if they want to specialize later on in their athletic careers or not.⁸ For a child to have good proprioceptive abilities while performing sport specific activities, indicates good neuromuscular control and has an impact on injury risk.¹⁰ Participation in a variety of sports to some degree develops aspects of neuromuscular control such as endurance, stability, movement quality, power, strength, flexibility, agility, and speed.¹⁰ If one or more of these aspects of neuromuscular control is not developed properly, deficits may arise which can lead to increased risk of injury and having to compromise participation in physical activity as a whole.¹⁰ Diversified training in youth athletics throughout the early and middle childhood years is seen to be more effective in

the development of 'elite level' skills in one's primary sport.¹¹ This is due to the positive transfer of skills via a more fully developed motor skill set.¹¹

DiStefano et al conducted a study in which they were trying to determine if youth athletes who only participated in one sport (ESS) or in multiple sports (sport sampling) would demonstrate better landing mechanics via the Landing Error Scoring System (LESS).¹⁰ They ultimately determined that youth athletes who participated in multiple sports demonstrated fewer landing mechanics errors as compared to the other experimental group (ESS).¹⁰ This demonstration of neuromuscular control, accomplished because of sport sampling, reduces the risk of long-term consequences such as future musculoskeletal injury, physical inactivity, and a compromised state of health and well-being.¹⁰

What is Said Against Sport Sampling?

Rejeb et al conducted a study focusing on overuse injury incidence in trained multisport athletes. This is an instance of what would be considered sport sampling. The focus of their study was to examine the injury incidence in highly trained adolescent athletes.⁵ Though he did find a higher rate of injury incidence there are multiple issues with this study. First off, the longitudinal study that Rejeb et al conducted had a lot of fluctuation in its participants throughout the years. With many athletes dropping out and new ones joining, the subjects of the study were never constant. Another issue that I had with this study is that nowhere was it indicated that the children who took part in this study had any sort of landing mechanics training or technique training. If an athlete is exposed to high volumes of work and not taught properly how to execute, that is not the fault of the sport but rather the fault of the coaches for

not adequately preparing their athletes. Lastly, Rejeb et al states that most of the injuries seen were minor injuries.⁵ The injuries that are seen and dealt with in EES are chronic and potentially career ending injuries that could have significant impact on the wellbeing of the athlete.

Physical Risks/Common Injuries

One of the biggest concerns regarding this whole debate is the youth athlete's physical health and their chances of developing either acute or long-term injuries as a result of repetitive physical stress and overuse. About 2.6 million children and adolescents possess injuries from participation in sport that are severe enough to require emergency room treatment.⁸ Typically, children involved in ESS develop chronic injuries that arise as a result of repetitive microtrauma.⁸ This microtrauma is seen as consistent submaximal loading of the bones, muscles, and tendons far beyond what a child's body can anatomically handle, in terms of the exercises that they are performing leading to positive adaptations.⁸ In its most severe form, ESS can lead to high risk of acute injury and a high risk of serious overuse injury.³ In a cohort study done on elite youth soccer players (younger than 14 years old) it was found that more acute and overuse injuries were sustained in comparison to older players of the same elite status, during training time.¹¹ The younger elite players saw injury occur more frequently in the early portion of the season, suggesting that those youth athletes might not have achieved peak fitness levels or that they had been exposed to fitness intensities that, at their developmental stage, could adversely impact their fitness.¹¹ This is obviously an outcome that we want to avoid when children are put onto sports teams or choose to get involved in any form of physical activity.

There are many common injuries that are seen in sport specialists. One of the utmost concerns is injury to the growth plates. Damage to the epiphyseal plate occurs when the stress tolerance is exceeded by the constant mechanical stress of high intensity high volume sports.⁸ A growth plate injury threatens normal development with the possibility of developing discrepancies in the length of bones, angular deformity, and altered joint mechanics leading to long-term disability.⁸ Some other common injuries that are seen among different sports are high rates of shoulder and elbow injury due to the repeated abduction and external rotation of the shoulder in elite tennis players when learning to serve.³ Baseball pitchers are also frequently seen with elbow injuries due to high volumes of pitching.³ Seventy to eighty percent of pitching injuries seen in youth athletes are progressive meaning that youth pitchers are pitching through the pain.¹ In the case study done by Ferguson and Stern, figure 4 summarizes some of the modifiable risk factors for injury in youth pitchers.¹ Just as an example, their figure shows that for a risk of elbow/shoulder surgery regularly throwing with arm fatigue versus throwing more than 8 months per year has an odds ratio of 36 versus 5.¹

Closely linked to injury risk is the factor of scheduling. Scheduling of practices, games, and tournaments is a factor which has increased the injury risk in youth athletes.¹¹ The primary concern has to do with a more standard year round training that is normally seen in ESS, but also in single sport simultaneous involvement on multiple teams all for the same primary sport.¹¹ Some of the consequences of repeated same day exercise include an increase in cardiovascular and thermal strain; this also leads to an increase in perception of effort in subsequent activity bouts.¹¹ This ultimately comes down to the relative workload to recovery

time ratio that isn't adequate for the high volumes of work being done by young children during a tournament which can last over a period of several days.¹¹

Psychological Effects

ESS and sport sampling are not only a matter of physical health and concerns. The psychological aspect of youth sports is one that cannot be overlooked. With children not being fully cognitively developed and already being so impressionable, their mental health is important to consider. Throughout the course of a child's development, their perception of competence tends to decrease, yet it also becomes more accurate.¹² With age, children show a more proficient ability to use internalized or self-determined performance standards via the use of psychologically based information, such as how they are feeling or what they perceive around them.¹² That being said, in a case of ESS it is certainly possible that a child specialist could develop a sort of fixation on performance outcomes, consequently resulting in peer comparison and evaluative coaching feedback being the framework of his or her own sport competence.¹² When a child participates in sport sampling they aren't as oriented on one specific performance outcome allowing those children to not be constantly haunted by the comparisons experienced in ESS. Specialized training comes along with the psychological risk of burnout and depression.³ Burnout can be seen as a spectrum of overreaching and overtraining.¹¹ Overreaching can be further broken down into functional overreaching (FOR) which is when an athlete trains excessively resulting in short-term decrements in performance, or nonfunctional overreaching (NFOR) which is when high intensity training occurs for a prolonged period without adequate recovery and regeneration.^{11,13} Overtraining syndrome

(OTS) is more synonymous with burnout as it refers to a prolonged maladaptation of an athlete's regulatory mechanisms within the body.^{11,13} This spectrum also exhibits psychological implications such as mood swings, abnormal emotion, and sleep disturbances.¹³ With this, burnout can be seen as a response to chronic stress, of which there are four stages: an athlete is placed in an overwhelmingly demanding situation, those demands are felt to be excessive, the athlete experiences physiological responses, and lastly varying psychological consequences develop.¹¹ This in turn may be the reason why youth athletes who choose to specialize retire from sports at such a young age.³ In order to prevent this parents/coaches need to remember the true purpose of involving children in sports. According to the Long Term Athlete Development (LTAD) model, the first stage of athletic development in youth athletes is the FUNdamental stage.¹ Athletics should be centered around fun when it comes to youth athletes. At this time athletes should just be learning to engage with the sport and should be discovering intrinsic motivators that encourage them to achieve their goals and to continue participating in sports.^{1,3} Due to the lack of a competitive edge associated with the deliberate play aspect of sport sampling, there is less likely to be fits of anxiety and depression in children who participate.⁶ Another major psychological component of this issue is the pressure put on youth athletes to be striving towards collegiate scholarships and in some rarer cases even professional/elite status.³ With this sense of pressure coming from coaches, parents, and internally within the athlete, mental battles start to be fought in the mind of the child. Athletes lose a sense of identity and start to believe that they have no control over the decisions that have to be made in their lives; their decision making power has essentially been stripped from them.³

Sports attrition is also another concern related to ESS.³ Attrition, commonly recognized as the likelihood of dropout, can be seen as a sign of the onset of player burnout; burnout is a dangerous symptom because it can arise from a multitude of different factors.³ The combination of physical and psychological pressures the athlete has to face can contribute to player burnout at a very young age.³ A good rule of thumb is that children who are participating in more hours of sport per week than their age or for more than 16 hours per week of intense training are at higher risk for burnout and should be closely monitored.⁴ Youth sports does not fit into a cookie cutter mold; every child is different and their training should be unique to them anatomically, physiologically and psychosocially.⁴ This in turn will build a strong foundation for the athlete to develop his/her athletic skillset off of.⁴

Social Effects

One of the most standard aspects of ESS is the initiation of the intense training volume by parents, coaches, or trainers.¹ Coaches are usually some of the first people to recognize and voice their opinion on the athletic talent a child possesses.¹ That being said, coaches and parents are two of the major social influences on young children to go into specialization.¹ As a result of those influences, concerns start to surface that sport specialization at an early age is forcing children into social isolation.¹⁴ Being involved in these specialization programs has the tendency to separate young athletes from their peers consequently interfering with normal identity development.¹⁴ Even within the realm of sport there are cases of social isolation. For example, some children that go through early biological maturation have a more advantageous start to their career in sport. In some cases children can be moved up a division to play with

older kids due to their outstanding athletic capabilities (from a U12 team to a U14 team).¹² This could potentially have negative adverse effects on the child's development of peer social relationships.¹² They might not as well understand social cues, not as easily be able to engage in conversation, and they might struggle in forming bonds outside of the sport. This in turn could also lead to some psychological problems previously mentioned such as perception of competence issues and self-worth struggles.¹² With sport sampling, children are more likely to develop five socially oriented outcomes: life skills, prosocial behavior, healthy identity, a diverse peer group, and social capital.⁶ Participation in only one sport equates to being familiar with only one set of norms. When a child participates in multiple sports, they are not limiting themselves to a single set of ideals. Instead they expose themselves to a plethora of norms that allows them to truly understand their place in the world and more accurately allows them to make their own choices and decisions.⁶ Sampling also gives children multiple outlets to socialize, interact, and make friends.⁶ Sampling does not leave children confined to one circle of people that they are consistently around.

Social media also plays a huge role in the social influences of children to specialize. We live in a very commercialized society where endless advertisements, training programs, and commercials are homing in on the youth athletic population as their target for sales and hoping that the parents of these youth athletes will be their main audience.¹ Social media also allows for a possible predisposition of body image challenges with certain youth athletes. Children and young adolescents who specialize in aesthetic-oriented sport (i.e. gymnastics, figure skating, ballet) are in some sense judged based on their appearance and proportion.¹² This can often lead to high levels of something called social physique anxiety.¹² Through these social media

outlets, there is a perceived idea that a sport should be a young athlete's soul focus; that all decisions they make should revolve around their training for that one specific sport. Things like nutrition, training frequency, and the importance of sleep are all compromised through social media advertisements/influencers.

Recommendations

Throughout the ESS research process that has gone on in recent decades, many field experts have come up with certain recommendations and guidelines for ways to ensure that children are safely participating in sport. First and foremost, it is of the utmost importance that youth athletes have a good relationship with and are frequently going to see their health care providers.¹¹ Physical and psychological evaluations should occur when necessary to ensure a minimization of physical exhaustion and burnout symptoms.¹¹

It is also important that parents and coaches be properly educated on the concept of sport readiness.¹¹ There are many sources readily available on the internet that parents and coaches could easily access to gain some basic knowledge on the importance of sport sampling for children. For example, Project Play by The Aspen Institute offers a checklist to encourage sport sampling that addresses being in an environment that fosters multi-sport engagement, embracing physical literacy, and minimizing the importance of championship titles or rankings.¹⁵ There is also a site called Moms Team, that offers specific guidelines for parents. Some of those guidelines include emphasizing the fun in sport, nourishing your child's dream and not your own, and not putting too much emphasis on competition.¹⁶ They emphasize the fact that most children aren't cognitively mature enough to participate in such serious

competition and at this stage they should be focusing on fundamentals and skill development as suggested on the popular 'Mountain of Motor Development' model by Clarke and Metcalfe.^{7,16}

Conclusion

All in all, early sport specialization is an intense, year-round training program that focuses on one specific sport from a young age, at the exclusion of all other sports.^{1,2,3} Participating in ESS can lead to many negative consequences related to physical injury, psychological disturbances, and social effects. Sport sampling is a much better alternative that allows youth athletes to participate in multiple different sports and develop the proper comprehensive motor skills and technical skills. Sport sampling is a more advantageous option for youth athletes and is a better option for their overall well-being. Many resources are available to help coaches, parents, and athletes understand the benefits of sport sampling and how they can affectively contribute to that style of involvement in sport. It is now important that these resources are available to all adults who contribute in any way to youth athletics. Having the recommendations previously mentioned handed out to parents as guidelines for how they can help their children or requiring some sort of educational class on the material addressed in this paper would be a healthy step in the right direction.

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