

The Issues Surrounding Sport Specialization in Youth Sports

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Heather Conklin

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Cathy Houston-Wilson

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Cathy Houston-Wilson

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**Abstract**

The number of children participating in organized sports is at an all-time high and continuing to rise. With these numbers increasing so are the number of athletes participating in a single-sport and high intensity training. Research shows that athletes, coaches, and parents have many misconceptions about sport specialization. Results indicated that youth athletes are specializing in hopes to compete at the next level. Athletes that fell into a highly specialized category were more likely to obtain injuries, overuse injuries, burnout, and overall experience sport differently than those that were categorized as low specializing athletes.

## Chapter 1 – Introduction

Young athletes are the building blocks to the large mainstream industry of collegiate and professional sports. With the idolization and growth of opportunities to continue athletic careers comes along the debate of specializing in sports. Brenner (2007) estimated there to be thirty to forty-five million youth athletes participating in some variation of athletics, ranging from six to eighteen years old. These youth athletes are being encouraged to exclude all sports but one, in order to maximize their performance in the sport of their choice (Brooks et al, 2018). The opportunities are endless for youth athletes to participate in sports, from recreational sports to highly organized and competitive school/ travel teams and even pre-Olympic/ USA team trainings. With each sport comes a different variant of commitment, training, and concerns (Brooks et al, 2018). While there is plenty of research that has been collected over the years of how specializing in a sport is perceived and the impacts it may have on athletes, the research is still unclear as to whether specializing in a sport is beneficial.

There are two arguments in research studies on sport specialization that are both supported by evidence-based information. The first argument is specializing in sports is beneficial for young athletes to achieve higher status of excellence and skill in their sport of choice. When an athlete specializes in a sport, they will improve their skills to an elite level which leads to the notion that they will be recruited at a higher level; travel teams, collegiate and/or professional teams (Brooks et al, 2018). These athletes have motivations to specialize in hopes to improve skills to an elite level, making all-star and/or travel teams, and receiving a scholarship or professional contract (Brooks et al,2018). The counterargument is that specializing in sports can negatively impact a young athlete's

lifestyle in multiple ways. Negative impacts of young athletes specializing in a sport brought up in research are increased chance of injury and/ or burn out, decrease in age-appropriate play and participating in sports that require technical skills to be developed earlier (Myer, 2015). This synthesis will be focusing on the issues surrounding youth athletes specializing in sports and the negative effects that are brought on by partaking in specialization.

### **Statement of the Problem**

The pressure on young athletes to specialize in a sport at an early age by selecting one sport to the exclusion of others is a notion coming from coaches, parents and peer athletes (Myer et al, 2015). The main concern that comes from specializing in a singular sport is that these young athletes are at a higher risk of burning out, overuse injuries, and stopping participation in sport(s) (Myer, 2015). Specializing in a sport is physically/ financially demanding and time consuming. Youth athletes that make the commitment to specialize in a sport are committed to their school team, travel team, and sport specific training that can take shape and form in a variety of ways. Jayanthi (2015) noted that the American Academy of Pediatrics stated there were potential risks of high-intensity training and sports specialization in young athletes. Young athletes that specialize in sports may suffer from potential risk involved with physical, physiological and psychological demands that coincide with high intensity training and competition. (Jayanthi et al, 2015). Research supports the notion that there are more risk and issues with sport specialization than there are benefits, yet coaches, athletes and parents still have the perception that it is necessary in order for these athletes to compete at the next level.

### **Purpose Statement**

The purpose of this synthesis is to review the literature on issues surrounding sport specialization in youth sport.

### **Operational Definitions**

- 1) Sport Specialization- “Athletes distribute their time and energy in a single sport versus among multiple sports. This includes the pursuit of elite status in a signature sport, often to the exclusion of other sports, with intensive training loads and durations” (DiSanti et al, 2019).
- 2) Youth Athletes- Athletes participating in some variation of athletics, ranging from six to eighteen years of age (Brooks et al, 2018).

### **Research Question(s)**

- 1) What are factors that are important for participation in youth sport?
- 2) What are the risks of early sport specialization?
- 3) What impact are parents, high school coaches, and club coaches having on sport specialization?
- 4) What beliefs do athletes have about specialization?

### **Delimitations**

The articles used in the literature review of the synthesis were:

- 1) Peer reviewed, English and Full text.
- 2) The search included articles between 2010-2020.
- 3) The peer reviewed scholarly articles focused on the risks and benefits of high school athlete’s specializing in sports and the perspective of coaches, parents and athletes.

## Chapter 2: Methods

The purpose of this chapter is to present the methods used to review the literature on issues surrounding early sport specialization. An extensive search was conducted to find the proper articles to abstract information from. Although pieces of literature used in this synthesis may have a biased stance on specializing in a sport being beneficial or not, the perspective of this synthesis is non-biased. In this Chapter, there will be detailed steps of the methods used in finding the selected articles and information obtained for the use of this synthesis.

The search for obtaining literature began with using the SUNY Brockport's Drake Memorial Library website. From their website, they have a field of study-specific searches. For example, this synthesis falls into two categories, the first being Education and the second being, Kinesiology, Sport Studies & Physical Education. Selecting a specific field of study provided databases that will search literature that is appropriate information for this synthesis. Education was chosen because the demographic for this synthesis is high schoolers. The second field of study was chosen due to the synthesis focusing on athletes and sport specialization. EBSCO Host provides us with the following databases when searching under the chosen subjects: SportDiscus, Academic Search Complete, and Education Source. All three of these databases produced a mass number of articles about the keywords selected.

Keywords for the search were used to find articles that would correlate with the research. The keywords chosen were sport specialization, high school, and athlete. These keywords were selected based on their direct relevance to the research questions. All three of these keywords were important to have appear in the articles, therefore in an

advanced search “OR” would not be subject to use but “AND” could be. Sports specialization was the most important for the search based on it being the topic of discussion. The keyword high school is significant because it is the demographic the study is targeting. Lastly, by using the word athlete it cuts out of the search nonrecreational participation.

The first search was conducted within the Kinesiology, Sport Studies & Physical Education subject field, which uses SPORTDiscus and Academic Complete as its databases. Using the keyword sport specialization resulted in a vast number of articles, totaling 656. Multiple limiters were used in the first search, full text and a publish date between the years 2010-2021 were applied. A source type of scholarly (peer-reviewed) journals was implicated. English-only articles were selected as the language. A total of 656, were too many articles with topics not specific to our purpose. To dwindle the results down, the keyword high school was used, which resulted in a drastic drop down to 83 articles. Applying the term athletes resulted in 53 articles of use. To finalize the search by using the thesaurus, DE "HIGH school athletes" in the first search bar and specialization in the second will result in 10 articles.

The ten articles produced in the refined search gave three solid articles that were used in this study. From there, more articles were found using the ancestry method. The ancestry method is using articles that were used and cited in the literature being read and then using selected articles to use for the literature review as well. When selecting articles through the ancestry method they needed to meet the criteria of the synthesis. The criteria that needed to be met was that it was published within the last ten years, remained sport specialization-based, and had a directed population of high school athletes.

The articles found were collected from journals such as *The American Journal of Sports Medicine*, *Orthopaedic Journal of Sports Medicine*, *Journal of Athletic Training*, *Sports Health*, *Clinical Journal of Sports Medicine*, *International Journal of Exercise Science*, *Journal of Sport Rehabilitation* and *Sage Journals*. The commonality between all the listed publications is that they all are medicine and sports-specific publication sources.

The critical mass for this synthesis is comprised of 11,736 participants, the majority of them being youth athletes. Other participants that accumulated for the other portion of the responses included coaches, parents, collegiate and professional athletes. These subjects were obtained through multiple sources including high schools, travel club teams, colleges, professional leagues, physical therapist, team physicians, athletic trainers and orthopedic surgeons. Demographic regions were important in the research due to population and location having a significant impact on sport participation and specialization. The average age of survey respondents were between the ages of 7-18 years old. However, when surveys were given to parents and collegiate or professional athletes that were recalling their own youth participation the age range increases by a few plus years.

The articles chosen for the purpose of this synthesis included a mix of qualitative and quantitative research. The literature review included three cross sectionals, five surveys and two case control studies. Although most of these methods fall under the qualitative category, researchers created and/or used numeric scales to turn information into statistical data, causing it to become quantitative research as well. In one study a novel instrument was created by medical professionals to assess the driving factors

behind youth specialization. By having questions for athletes to answer and then evaluating them using a scale allows for clearer comprehensive when collecting data from surveys. Another study used the Youth Sport Specialization Perception Scale (YSSPS) that allowed them to examine attitudes, beliefs and values of sport stakeholders related to sport specialization through a 25-item survey. While each study selected a slightly different way to collect, determine and calculate their data, they all came to similar conclusions.

With many commonalities amongst the selected articles there were some challenges faced while conducting research. Sport specialization has been a topic of discussion for decades now but only within the most recent years have researchers found ways to collect empirical evidence to support the theories on sport specialization. Therefore, having the limiter set to produce articles within the most recent ten years was extremely important. To combat the issue of having a mass number of articles on a single topic produced it was necessary to dwindle the results by focusing on the main purpose of this synthesis. Each article selected provided a plethora of knowledge regarding sport specialization.

### **Chapter 3: Review of Literature**

The purpose of this chapter is to present a review of literature on the issues surrounding sport specialization in youth sports. In particular, the following topics will be reviewed: injuries that occur due to overuse and training, mental toughness, attitudes and beliefs of coaches, parents, and current/ former athletes that occur with sport specialization. These key points are important to discuss because they pave the way for the controversial conversation of sport specialization. The Aspen Institute's Project of Play (2019) reported that 38% of children six through twelve years old participated in sport on a regular basis in the United States in the year 2018, averaging to around 9 million American children regularly participating in sports.

Sport specialization is defined differently by different researchers, one definition is year-round intensive training in a single sport at the exclusion of other sports (Jayanthi et al., 2015). Athletes have defined sport specialization as a single sport being more important than others (Moseid et al., 2019). Since there is not a set standard definition of early sport specialization, researchers have emphasized that there is an inconsistency in research on early sport specialization. Although researchers have various ways of defining sport specialization there is a commonality shared in literature surrounding the issues on early sport specialization. Several accredited organizations have stated their stance against the practice of specializing in a sport at an early age for youth athletes. Bell et al., (2016) stated that school size is a major factor in early specialization by providing evidence that athletes enrolled into larger populated schools are more likely to specialize in sport. To become an elite athlete, it is inevitable that specialization at some point will be a necessity when higher levels of training and commitment are being

demanded. However, most researchers do not recommend the practice of early specialization suggesting that it leads to negative outcomes such as increased injury rates (Hall et al., 2015).

### **Injuries**

When it comes to participation in sport, injuries are inevitable to occur for most athletes but when an athlete commits to a single sport with intensive year-round training, the odds are increased, and the risks become higher. Between the ages of 5 and 24, 1 in 5 of every person's injuries are related to physical activity-sports (Bell et al., 2016). Even with organized sport being around for decades, studies as recently as 2018 still suggest an overall lack of research on specialization and its connection to overuse injuries. Bell et al, 2018 did a meta-analysis on specialization and overuse of musculoskeletal injuries that had only four studies involved, supporting this statement. However, researchers have been using various methods to collect data as evidence supporting the risk of injury that is caused by early specialization.

In a clinical case-control study conducted by Jayanthi, et al., (2015) a group of injured athletes from the ages 7 to eighteen years old were surveyed, 822 of these participants were injured with 49.2% being male and 50.8% females. The selected athletes had completed a survey that reported; hours per week spent in organized sports, physical education classes, free play, degree of sport specialization, history of injuries along with their Tanner stage. Data collected included height, weight and electronic medical records. The survey and data collected provided substantial evidence that there is a direct correlation between the age of athletes and the total amount of hours spent per week in sport specialized training to the risk of injury and serious overuse. As compared

to athletes who did not have a severe overuse injury, athletes with a serious overuse injury were 1.90 times more likely to be highly specialized. Jayanthi et al., used location of body parts to group injuries with the most common location of injuries reported from least to greatest, being head/neck, shoulders, lower back, foot/ankle, and knee. Using location to define injuries is great for generalization and pinpointing areas of the body, but when broken down to diagnoses and definitions of what injuries were reported at such young ages, these injuries are deemed to be quite serious. 32.6% of the injuries reported were acute, while a drastic 67.8% were from overuse with 23.5% of them being serious injuries. Examples provided of serious overuse injuries were spondylosis and pars stress fractures to the spine, Osteochondritis dissecans (OCD), ligament injuries in the elbow, stress fractures, and athletes with a serious overuse injury who do not have a definitive diagnosis. Spondylolysis was the lowest reported injury of 4%, yet these 4% are suffering from wear and tear of their spinal disks, which is often described as degenerative arthritis of the spine that worsens with age once developed. Patellofemoral pain was the highest reported injury of 9.0%, which is commonly known as “runner’s knee” causing tightness and pain in the front of the knee and around the kneecap (Jayanthi, et. al 2015). The same group of researchers completed a comparison between participation, age and specialization by injury type that provided substantial evidence against specialization. Findings indicated were: 1) Injured athletes reported more time participating in physical and organized sports activity than those uninjured 2) Primarily, girls totaled less time in physical activity than both categorizes of injured and uninjured boys 3) Against the number of years old, the chances of completing a higher number of structured weekly sports hours was reported 1.55 times more likely by injured athletes 4) As compared to

athletes without serious overuse injuries, athletes with serious overuse injuries had two times the chances of completing more structured weekly sports hours than age years. In full disclosure, these researchers did not adjust for age and hours in these ratios because it would have accounted for age and hours/week variables twice. Yet, after adjusting age, athletes with serious overuse injuries had 1.70 times the chance of amassing twice as many organized sports hours to free play hours as those without serious overuse injuries. This shows that there was only a significant difference when the athletes were participating more frequently in high intensity trainings (Jayanthi et. al 2015). Most importantly, athletes that were injured were older and had participated in more hours per week in organized sports compared to those not injured. Similarly, Bell et al. 2016 had comparable statistical outcomes.

Bell and his co-authors conducted a 1-year observation study on the prevalence of sport specialization on athletes aged from 13-18 years old. A total of 302 athletes, 180 females and 122 males completed a sport specialization survey in addition to an injury survey. Athletes were pooled from two high schools, one being large with an attendance of 2,141 students and the other being small having a 603-student attendance. Along with Jayanthi et al., they separated athletes into three categories: low, moderate and high specialization. In order to properly place athletes into the right category a series of three questions were asked to the athletes, on a 1-3 scale point scale. A "yes" answer was worth one point, while a "no" answer was worth zero points. Specialization was evaluated as 0-1 for low specialization, 2 for moderate specialization, and 3 for high specialization. Therefore, if an athlete responded "yes" to all three, they would be classified as highly specialized. The three questions asked that determined the category an athlete would fall

under were: “1) if athletes quit other sports to focus on their main sport; 2) if they viewed their primary sport as more important than other sports; and 3) if they trained or participated in their primary sport more than 8 months of the year” (Bell et al., 2016, pg.1470). Scores identified, 105 athletes as low, 87 as moderate and 110 as high specialization. This 3-point classification scale was used to compare results to sex and grade year in school to sport specialization. Results indicated that athletes in the high specialization category were more likely to report a history of overuse knee or hip injuries which correlates with the findings of Jayanthi et al., (2015) reporting their athlete’s highest injury location being the knee. When compared to athletes with no history of overuse knee injuries, those with a history of overuse knee injuries were more likely to be in the high specialization group. Athletes who said "yes" to training for more than eight months a year were more probable to report history of any type of knee injury, any type of hip injury, and overuse knee injuries. Findings from this study notion that level of classification and hours participating in sports, weekly per year, are a significant contributor to an increased risk of injury observed in highly specialized athletes (Bell, et al., 2016). Disparate from previous research, this article also used a self- classification method to compare results to the 3-point scale classification system. The self- classification method simply asked athletes if they considered themselves as a single- sport or multi- sport athlete. When comparing methods and the data collected there are distinct differences in results. When school size was compared to the frequency of sport specialization using the single sport/multiple sport self-classification method, the small school had 14% of athletes report they were single sport, 86% multisport vs the large school having 44% single sport and 56% multisport athletes. In contrast, when using the

3-point scale, the small school had 43% low, 32% moderate, 25% high and the large school had 26% low, 26% moderate and 48% high. These statistics reveal a discrepancy between the two methods determining that it is difficult to classify athletes based on the level of specialization. In addition, it appears that most athletes viewed themselves as multisport athletes, but the 3-point scale determined them differently. Further supporting, 29.5% viewed themselves as single sport athletes, yet the 3-point scale classified 36.4% being highly specialized. After comparing the two methods, Bell et al., concluded that the 3-point scale is a more accurate tool of measurement for classifying specialization.

Interestingly, large schools were more likely to have athletes categorized as highly specialized. Therefore, a major point to take away from this article is that school sizes may play a bigger role in early sport specialization and would need more researcher conducted to prove so.

Comparatively, Post et al., (2017) used a case study with 2,011 youth athletes participated, 989 female athletes and 1,022 male athletes between the ages of 12 and 18 years old. Athletes were given a questionnaire in relation to their specialization statuses, rate of yearly and weekly sport participation, and history of injuries. Researchers used the same 3-point scale classification system as Bell et al., (2016) described previously. In addition, athletes were asked to report: 1) months per year that they participated in their primary sport; 2) estimate average hours per week of participation in their primary sport during season; 3) average total of hours per week participating in organized sport; and 4) average hours per week participating in unorganized sports. Athletes were classified as meeting or exceeding the different sport volume recommendations based on their responses. Jayanthi et al also used these questions to help determine the volume of

training more accurately which helps connect time spent to overuse injuries. Similarly, to the Jayanthi et al., (2015), they grouped together injuries by body location with a few additional groups, including head/neck, shoulder, elbow, wrist/hand, upper leg, knee, lower leg, ankle and foot. Athletes were asked to describe the injury, describe how it happened including when it occurred, and estimate the number of days missed due to injury. History of injury outcomes reported were 14.7% lower body extremity overuse, 5.9% upper body overuse, and 8% diagnosed concussions. Since Post et al., used more body location groups of injuries than Jayanthi comparing data is not completely parallel. However, both articles reported that the most common overuse injury body location was the knee. There also was a small marginal difference of only .7% on history of concussions reported between both articles. The statement that there is an association between specialization and history of injuries, overuse injuries, independent of age, sex and weekly organized sport hours, agrees with the research that Jayanthi et al., (2016) completed. An important finding that stood out was, when comparing athletes that had no injury history to athletes with a history of injury/overuse injury, athletes that with an injury/overuse injury history had started playing both organized sports and their primary sport at a younger age. Highly specialized athletes also accumulated more hours per week and more months of the year in playing time in both organized sport and primary sport (Post et al., 2017). Differently from Jayanthi et al. findings, this article had found a significant sex difference between injury categorizes and level of specialization. Post et al. also found that the likelihood of reporting a previous acute injury and/or overuse was higher for highly specialized athletes. The comparison of acute injuries reported to highly

specialized athletes contrast with other researcher; therefore, further research would have to be conducted to exam the relationship between sport specialization and acute injuries.

In a nonclinical population-based setting, Post et al. discovered that there is a significant association between sport specialization and injury history. In particular, highly specialized athletes were 45 percent to 91 percent more likely to report a previous injury than athletes in lower specialized categories. Additionally, youth athletes who exceeded sport volume recommendations of months per year and hours per week had a 26 percent to 85 percent higher chance of reporting a previous injury. Two finalizing findings were that 15 years of age was found to be the peak age at which prevalence is specialization appears and that females compared to males were more likely to be classified as highly specialized (Post et al., 2017).

While Bell et al., Post et al., and Jayanthi et al. had similar approaches and findings in their research an article published by Buckley et al., (2017) provides a different look into sport specialization. Identically, they used the definition given by Jayanthi et al., (2015) of “intense, year-round [8+months/year] training in a single sport with the exclusion of other sports” to define overspecialization (pg. 1470). In this article a survey was given to 3,090 athletes throughout one year of which 503 were high school athletes, 856 collegiate athletes, and 1,731 professional athletes, in order to retrospectively compare single-sport specialization. All participants had to complete a physical examination in order to partake in the study. The demographics, current sport engagement, memory of injury that disrupted sport participation and needed specific care, future athletic plans, and perspectives on specialization were all covered in the survey. The survey pool was made up of twelve high schools (HS), two Division I, six Division

III and two major league sports teams. By collecting data from such a large and diverse population allowed for responses related to sports backgrounds to be across the spectrum. The mean age varied dependent on the athlete's demographic,  $15.3 \pm 1.4$  years for HS,  $19.6 \pm 1.3$  years for collegiate, and  $23.6 \pm 3.5$  years for professional athletes (Buckely et al., 2017). Unlike the pervious articles, the age range was higher due to this research being done in retrospect for some of the participants. Results showed a staggering 67.7% of current collegiate athletes had specialized by playing a single sport during their childhood. The mean age of when these athletes quit other sports to focus on one was  $12.7 \pm 2.4$  years old of HS athletes compared to  $14.7 \pm 2.4$  years old of professional athletes. When asked if they have ever sustained an injury due to specializing in a single sport 39% HS, 42.3% collegiate, and 25.4% professional athletes all responded yes (Buckley, et al., 2017). From these result, two major conclusions can be drawn. The first being that current high school athletes had specialized at a younger age than professional athlete and secondly, committing more months/year to train and compete in a single sport can increase their likelihood of injury.

The correlation between sport specialization and injury risk, including overuse injuries, remains a debate in research. By using the same if not similar definitions of early sport specialization allowed researchers to collect data, draw conclusions and compare their findings within relative terms. While there still needs to be further research conducted on acute injuries and strategies that will enhance youth athletes sport experience while minimizing sports injuries. Researchers have found a solid grasp on the impacts that early sport specialization has on youth athletes. Overtraining is a recognized risk factor for youth sports injury, with overuse injuries accounting for up to 54.4 percent

of injuries seen in a standard sports medicine clinic for patients aged 6 to 18 years old (Buckly et al., 2017). In addition, these studies are all in agreement that the risk of injury increases with exposure hours per week for young athletes. Furthermore, Jayanthi et al., (2016) suggested that, while not necessarily more likely to suffer acute injuries, specialized athletes are at an increased risk of overuse and severe injuries, and that specialized training is an independent risk factor for such injuries. Unanimously, these articles were in agreement that single-sport athletes had an increased chance of injury compared to multisport athletes. In conclusion, the studies above suggest that early sport specialization puts young athletes at an increased risk of injury.

### **Attitudes and Beliefs**

While organized sports do provide many positive benefits, the pressure put on winning, improving sport success, and receiving an athletic college scholarship has contributed to an increase in intentional practice and competition in youth sports. Knowing and understanding the different perceptions of parents, club/ school coaches, and athletes on factors influencing their participation/role in specialization is important information to have in order to properly educate participants on the common misconceptions of early sport specialization. Even though research supports that there are many negative consequences to early sport specialization, many believe that specializing is necessary in order to compete at the next level.

### **Parents**

A very recently published article on the different perceptions of parents and children on factors influencing sport specialization by Hernandez et al., (2021) did a cross-sectional study through a survey with 1,998 participants. Of which, 993 were children

and 1,005 were parents participating in taking a self-administered survey. The survey was split into four sections 1) demographics (age, gender, socioeconomic status, and sports participation information) 2) sport specialization status 3) attitudes and beliefs on sport specialization and youth sport participation and 4) past 12 month of injury history. The same 3-point sport specialization classification system (low, moderate, and high) was used to help quantify and evaluate risk factors dependent on the athletes' responses or the parents' responses about the athlete. A scale 0-3, with 0- 1 being lowly, 2 moderately, and 3 highly classified was used to determine an athlete's classification, when answering, yes is one point and no is zero points. The following questions pertained to asking if the athletes had quit other sports to focus on one, if they could identify a primary sport, and if they train or participate in their primary sport for more than 8 months out of the year. For the third section, on attitudes and beliefs, a 5-point Likert scale ("not at all," "a little," "somewhat," "very," and "extremely" were used to validate the responses to the questions (Hernandez et al., 2021). The questions were put into three separate sections: 1) attitudes towards injuries; 2) beliefs on the potential benefits and consequences of sport specialization and 3) attitudes towards the importance of or various factors in deciding to participate in sport (Hernandez et al., 2021). In addition, other questions were asked such as belief that they or their child would receive a scholarship, continue playing at the next level and amount of time spent in sport. What was most interesting about the findings was that the perception the child athletes had verses their parents were significantly different. When determining specialization status of the children, 225 of the children classified themselves low, 350 as moderate and 202 as highly specialized. In comparison, the parents classified their children differently, with 431 low, 343 moderate and 202

highly classifying their children. With the biggest gap difference of 186 being between children considering themselves as more highly specialized than parents.

Moving into the attitudes and beliefs section, where the children and parents were asked the three questions using the 5-point Likert scale, results indicated again, a difference in responses. When asked how concerned they were about getting injured playing sports, parents were more concerned than the children. When asked about how much they believe they will be receiving a college athletic scholarship, children were more likely to believe that specialization was correlated to their chances of receiving one. Lastly, when asked how many would receive an athletic scholarship, 93.8% of parents compared to 85.6% children believed “a few” or “some of them” (Hernandez et al., 2021). Overall, results demonstrated that parents and their children shared different attitudes and beliefs about sport specialization.

An important piece of sport specialization is understanding the factors that are influencing children to participate in youth sport and which of these factors are important to them and their parents. Factors included winning, spending time with friends, developing life skills (teamwork, friendship, etc.), having fun, increasing ability to make high school varsity teams, getting better at their sport, being physically active, increasing ability to play on a travel, all-star, or elite-team, and increasing chances of receiving a college scholarship (Hernandez et. al 2021). Responses on what factors were more important between the children and parents were different. The parents were more likely to rate factors such as time with friends and having fun as “very” or “extremely” important. It is abundantly clear in this research that when comparing attitudes and beliefs of athletes to their parents, there is a disagreement between the two. The lack of

understanding and miscommunication occurring indicates that there is a need for improved communications and education in repute to the benefits and risks of sport specialization (Hernandez et al., 2021).

### **Athletes- Current & Former**

As identified, athletes have different attitudes and beliefs when it comes to sport specialization that is supported by these researchers' findings. Hernandez et al., (2021) provided data on what children considered their primary sport, with basketball (315), soccer (141) and volleyball (279) all drastically above the other 13 sports. When comparing children to parents, children were more likely to rate the following factors as "very" important or "extremely" important: Winning (67% to 42%), life skills (81.7% to 68.4%), making a varsity team (82.6% to 57.9%), getting better at a sport (95.8% to 82.4%), being physically active (89.98% to 69.8%), ability to make a travel team (73.1% to 36.6%), and receiving an athletic college scholarship (67.1% to 26.3%) (Hernandez et al., 2021). These findings demonstrate that sport specialization is not only viewed differently by athletes and their parents but also that specialization seems to be more prevalent in some sports more than others.

In looking at intrinsic drive and extrinsic influences found in specialized athletes, Padaki et al., (2017) conducted a survey with 235 athletes between 7 and 18 years old. The survey consisted of 2 sections, the first being about demographics, asking typical demographical questions such as sex, self-classification of specialization, age at which specialization started, injury and surgery history. The second section was based on 15 questions evaluating factors that influenced the athlete's participation in the sport. Factors studied in this section were burnout, intrinsic enjoyment, pressure from parents, and time

spent (hrs./wk., mo./yr., etc.) Coincidentally, Padaki et al, (2017) used the same 5-point Likert scale to turn the collected responses into tangible data as Hernandez et al., (2021). This study found that the mean age for starting specialization was  $8.1 \pm 3.6$  years of age. Meaning, that at either point, youngest or oldest, these children are starting to specialize in elementary/middle school. The researchers explained why these children might be specializing at such a young age. When asked, what their highest level of play they hope to reach was, an average of 29.3 stated either “just for fun” (8.5), “travel team” (3.4) or “varsity” (17.4), while a drastic 37.4 responded “college” and 33.2 “pro”. These results indicate that young athletes have high aspiration to compete at a high level but unfortunately, the chances of competing at an elite level are slim. Only 3.3% to 6.8% of high school athletes are competing at a college level and the percentages are even smaller at the professional level (Hernandez et al., 2021). Goal setting is particularly important in life but the pressure at such a young age to strive towards these goals can be physically and mentally draining, leading to injuries and burnouts. Sixty percent of these athletes played their primary sport for at least 9 months per year, while 84% wished they could occasionally play more sports. By specializing at a young age, these athletes are being restricted of many youth experiences. Roughly, half these athletes thought that their academics had been negatively impacted by sports. While more than 70% thought their level of sport participation had disrupted their social lives (Padaki et al., 2017).

A big question surrounding early specialization is the role that parents, and coaches are taking by persuading the children to participate in a single sport versus multiple. Padaki et al., (2017) found that 22% of single-sport athletes were “often” or “always” told by a coach to not play other sports compared to multisport athletes that had

only 8% report the same. Thus, concluding that athletes that fall in the highly specialized category were more likely to have been told by coaches to not partake in other sports.

Another survey conducted by Brooks et al., (2018) focused-on knowledge, attitudes, and beliefs of youth athletes in a club sport setting. Of 974 athletes, 578 were female and 396 males with a mean age of 14.2 give or take 1.6 years of age. This sample size is significantly larger and older than the previous dissected surveys. These researchers gave a questionnaire made up of four different sections that was compiled of questions based on demographics, specialization status, attitudes and beliefs, and injury history. They also used the same 5-Likert scale that has been very commonly used thus far. Of the participants, 381 out of the 974 athletes were classified as highly specialized. Compared to Hernandez et al., Brooks and the other researchers collected data coinciding with the fact that some sports have more athletes specializing in them than others. Brooks et al., data also has the same three sports of basketball (309), soccer (139), and volleyball (272) being the most selected primary sports. While Hernandez at el., only had 13 sports listed, this article had 15 and still produced the same results with even more options.

When discussing influencing factors of specialization, athletes were more likely to believe in positive factors and less likely to believe in negative. For example, only 13% of athletes were concerned with risk of injuries while playing sports compared to more than 80% believing that specializing would increase their probability of making their high school team (Brooks et al., 2018). Opportunities to improve at their sport, being physically active, and having fun were three factors that most athletes ranked as significant in their sport participation. While these are great factors motivating athletes, there still were 382 athletes (40%) that listed making a college team as a 5 (a great deal)

on the Likert scale for a potential benefit of specialization (Brooks et al., 2018). Along with this, more than 44 percent of athletes listed increasing their chances of receiving a college athletic scholarship as a factor affecting their decision to participate in sports.

What differentiates this article from the previous is their approach to collect data from club athletes. By doing so, they found that 9 out of the 10 athletes played on a club team in addition to their school team. Brooks and the other researchers noted that athletes believing that they would receive an athletic scholarship were high due to players and parents investing time and money into club sports in hopes that it will pay off in the future. Overall, results from this study align with the others, proving yet again, that youth athlete's participation in specialization have specific beliefs influencing them that are not necessarily educated based.

All previously used articles on attitudes and beliefs have surveyed current athletes, coaches and parents involved in sport. Martin et al., (2017) took a different approach by retrospectively having Division I Collegiate Athletes discuss their perceptions of specialization. Participants were from three different Midwestern universities. A total of 1036 surveys were used to analyze the collected data, of which 466 were female, 559 were male and 11 participants did not specify sex. Athletes participating were involved in the following sports: football (206), track and field (114), soccer (109), cross-country (73), swimming and diving (72), baseball (65), wrestling (64), basketball (51), golf (46), tennis (42), rowing (39), gymnastics (37), volleyball (31), hockey (20), field hockey (27), softball (20), figure skating (11) and not disclosed (9). This shows the range and diversity of athlete's sports, which is an important role in specialization (Martin et al., 2017). Athletes were divided into three categories: receiving

a full scholarship (382), receiving a partial scholarship (384) and receiving zero funding (270). Similar to other research, a Likert scale was also used, unlike the others this scale was 9-points, 1 being “not important at all” and 9 being “Very Important”. Having a 4-point differential range compared to the others could have altered comparisons slightly. Out of the 1036 athletes, 432 had specialized in one sport prior to college with a mean age of  $12.43 \pm 3.78$  (Martin et al., 2017). Interestingly, these researchers calculated if there was a difference between age of specialization for specific sports. Results indicated that in the sport of gymnastics, gymnast specialized the earliest of all other athletes, while in the sport of baseball, they specialized at an older age compared to all other participants. Not shockingly, soccer was reported the highest specialized sport with more than 63% of soccer player specializing (Martin et al., 2017). Comparing this research to that of Padaki et al., (2017) their sample multisport participation started to decrease as their school year increased. However, more athletes still participated in more than one sport during their senior year. A notable finding was that there was no significant indication that sport experience and perceptions of specialization impacted their likelihood of receiving or not receiving a scholarship. This is important to know due to the common misconception that specialization will increase scholarship and elite-level opportunities. By retrospectively viewing these elite athletes’ perceptions of specialization allowed the researchers to provide information supporting the notion that athletes need to be informed that by participating in a single sport is not required to continue at an elite level.

## Coaches

Athletes participating in sport are greatly influenced and impacted by those teaching and developing their skills in their sport. These mighty influencers are their coaches. Coaches whether in a club or school setting may be significantly impacting young athletes' choices and level of commitment in sport. This section will look into the perceptions of specialization that coaches in both high school and club sports may have. DiSanti et al., (2019) surveyed a total of 769 participants of which 497 were high school coaches and 272 were club coaches. As demonstrated by other researchers in this literature review, basketball, soccer and volleyball continued to be the most popular and specialized sports, therefore, this study focused on coaches within these three sports. Interestingly, they used a 25- item survey called the Youth Sport Specialization Perception Scale (YSSPS), that examined the attitudes, beliefs, and values of sport sponsors in relation to sport specialization (DiSanti et al., 2019). Like previous researchers they used a Likert-type scale that ranged 1-4, 1 being strongly disagree and 4 being strongly agree.

The demographic for these coaches provides this research with a better understanding of who is coaching the youth and if perception changes based on the coaches' classifications. In this survey 34.6% of the coaches were female while 65.4% were male, with male coaches being more predominant at both the high school and club levels. Of the 769 participating coaches more than 58% coached female teams, while less than 31 coached male teams, and less than 11% coached both. There were also more high school coaches (497) participating than club coaches (272). Findings indicated that club coaches had a more positive look on specialization and considered their practices to be

“more adaptive” (DiSanti et al., 2019). The gender of the team had a significant impact on the coaches' views of sport specialization; among high school and club coaches, those who coached both sexes rated specialization as more positive than those who only coached males or females. Furthermore, male high school coaches rated specialization marginally higher than female high school coaches, while female club sport coaches rated specialization higher than male club sport coaches (DiSanti et al., 2019).

Similar to the research surrounding injuries and sport specialization, these researchers also found school size to be an important factor in the prevalence of specialization. Also in agreement, athletes that attended larger schools were more likely to specialize and identify as single-sport athletes than athletes at smaller schools (DiSanti et al., 2019). Data also showed that the coaches primary sport influences perceptions at both the club and high school level.

Generally, athletes that participate in individual sports are more likely to specialize due to needing to meet peak performance at a younger age. Nevertheless, athletes participating in team-sports are having an increase in the prevalence of specialization. Overall, the most important finding was that sport specialization is being more prominent in club settings, where these club coaches have higher expectations and standards of the athletes.

### **Mental Toughness**

Mental toughness refers to the ability to cope with both sport-related stressors as well as the ability to perform consistently and with control, in high-pressure situations (Buhrow et al., 2017). Mental toughness also includes the ability to believe in oneself, capability to focus on achieving set goals, controlling one's surroundings, handling

pressure while physically performing adequately, and coping with both success and failures. Buhrow et al., noted that athletes who attained higher mental toughness had the ability to separate themselves from other athletes. Therefore, mental toughness is a key factor for athletes to be able to surpass their peers.

Mental toughness can be broken down into three major defining components: mental, emotional and physical resiliency (Buhrow et al., 2017). Training the mind for peak performance, eliciting appropriate feelings, and being able to deal with discomfort and problems are all considered components of mental resiliency. Secondly, emotions contain four key components, which are flexibility, responsiveness, strength and resiliency. The physical component being the last, requires being physically prepared and preserving through challenges such as pain and/or discomfort (Buhrow et al., 2017). Education and awareness of mental illnesses is still an area individual are still lacking common knowledge on and acceptance of. Only within the last few years have schools pushed for advocacy and support of non-athletes and athletes with mental illness to feel heard and understood. This increased the importance of mental toughness within sports (Buhrow et al., 2017). A study conducted by Gao et al. (2012) was mentioned within this article for their findings on gender and athletes' status's role in mental toughness. Their findings revealed that male athletes when compared to female athletes and non-athletes had a higher level of mental toughness.

Jones et al., 2007 stated athletes that specialize in sport can lose two things, one being their ability to deal with stress of the sport, and two being, their enjoyment in the sport. In addition, burn out could play a factor in causing athletes more stress due to lack of enjoyment. Once an athlete loses enjoyment and starts to burnout, they lose the

capability to cope with the stressors of sport (Buhrow et al., 2017). With mental toughness being an important factor in sport performance, it is ideal to know its' relationship with sport specialization.

Buhrow and her colleagues studied the relationship between sport specialization and mental toughness in college athletes. Participants included 102 college athletes of which 57% were female athletes. A vast majority of the participants were white, while the other 6% of participants were either African American, Asian, or multi-racial. Sports included in this study were swimming/diving, golf, basketball, track and field/ cross country, softball, tennis, wrestling, and soccer. Forty-two percent of the athletes were freshmen, 16% sophomores, 24% juniors and 18% seniors of which 63% were starters and 93% were receiving some sort of scholarship money. The mean age for when specialization in sport occurred was 13.45 give or take 4.47+-.

Participants were split into two groups, group one being if they had specialized earlier than the age of 14 and group two being if they specialized after the age of 14. Each athlete completed a questionnaire based on their demographic, in addition to the, Mental, Emotional, and Bodily Toughness Inventory (MeBTough). The MeBTough assessment consist of the three mental toughness components pervious identified. This assessment includes 43 items that were quantified using a 4-point Likert scale, with 1 being almost never and 4 almost always (Buhrow et al., 2017). Scores ranged from 43 to 172, with a higher score indicating a higher mental toughness. Within the MeBTough 9 items were physical, 15 mental and 19 emotional.

Results indicated that there were no significant differences based on early specialization, gender, and age of specialization and mental toughness. While the

researchers hoped to see a difference like their colleagues, it is feasible that athletes in this study had similar sports experiences and had developed similar levels of mental toughness. Buhow et al., study also focused on Division I athletes that indicated as a majority that they had not specialized till college. Therefore, a conclusion can be drawn that these athletes have a higher mental toughness due to being more well-rounded.

### **Summary**

Researchers chose their variation of sport specialization definitions as either year-round intensive training in a single sport at the exclusion of other sports (Jayanthi et al., 2015) and/ or when an athlete identifies a single sport as more important than others (Moseid et al., 2019). This literature review provided ample evidence that not only showed that early specialization has a direct correlation with injuries but also that the beliefs and attitudes of the players, coaches and parents are common misconceptions leading them to think that specializing is a must.

It was unanimous throughout the articles that the benefits of specializing in sports at an early age do not outweigh the risks. Athletes that participated in specialization and categorized as highly specialized were more likely to burnout, were more prone to injuries, and were influenced by negative factors. The biggest commonality between all these articles was that there was a lack of communication and education around sport specialization. It is extremely important that not only athletes, but that parents and coaches are as knowledgeable about the real pros and cons of specialization.

Recommendations for athletes provided by Post et al., were that children participating in organized sports should not play one sport for more than 8 months out the year. Another is that a child should not participate in sport more hours and week than

their age, therefore if a child is 8 years old, they should only be participating 8 hours a week in organized sports. While there is an understanding that these recommendations cannot be strictly met, it is important to keep in mind to find a realistic balance between sport, academics, and social lives.

## Chapter 4

### Results, Discussion and Recommendations for Future Research

The purpose of this chapter is to present the results of the review of literature on the issues surrounding early sport specialization and how these results align with the purported research questions which guided this synthesis project. In addition, recommendations for future research as it relates to sport specialization in organized youth sports are presented.

The results of this review of literature revealed that early sport specialization is perceived by athletes, coaches and parents differently and there are many misconceptions between these individuals on the benefits it potentially could provide. While these individuals believe there are many perks to specializing early, the literature provides data that it is negatively impacting youth athletes by increasing their chances of injury, burnout and mental health issues. Even when retrospectively asking college and professional athletes about specializing in sport, majority had not specialized till they reached college and those that had stated they would not recommend their own children to.

The literature review also had many of the researchers in agreement that specializing in sport at a young age negatively impacts the children physically, mentally and socially. There was no evidence supporting that it increases the likeliness of competing in their primary sport at the next level or receiving an athletic scholarship. Interestingly, the literature showed that players, coaches and parents all have different intrinsic and extrinsic factors influencing them to partake in specialization. These factors are impacting the decision of individuals to picking whether to specialize or participate in

multiple sports. Findings in the literature support the notion that there are many issues surrounding specializing in a sport at a young age and that athletes and their counterparties are lacking information to make an educated decision.

## **Discussion**

### **Interpretations**

As part of this literature review, several research questions were posed. The first research question examined was what are factors that are important for participation in youth sport? Results indicated that children have different factors than parents affecting their decision to participate in sport(s). The most influencing factors for the children were winning, life skills, making a varsity team, getting better at sport, being physically active, ability to make a travel team, and obtain an athletic scholarship. Verse the parent's factors for their child participating were more oriented towards, spending time with friends and having fun (Hernandez et. al, 2021). Comparatively, 40.8% of children said that the factor of increasing their ability to play on a travel, all-star, or elite team is extremely important versus only 11.3% of parents agreeing. An even higher percentage of 44.3% of the children stated that the factor of increasing their chances of receiving a college scholarship was extremely important. While the second highest factor of 60.7% in the extremely category was having fun, only 9% less answered that they participate to increase their opportunity of making their high school varsity team (Hernandez et. al, 2021). Brooks et. al., 2018 had similar findings using the same scale and identical factors. More than 40% responded that the factors of increasing their chances to play on a travel, all start, or elite team along with receiving a college athletic scholarship. Almost identically to Hernandez, 60.6% said having fun was extremely important. While the

focus of this research was on the issues and consequences of sport specialization Brooks et al., (2018) had shared a potential benefit. The greatest benefit to the children was getting better at their sport, with a total of 68.2% finding it to be a great deal of importance. Hernandez et al., (2021) had similar findings supporting this statement. In Padaki et al., (2017) study youth athletes were asked what their highest level of play do they aspire to reach, with 8.5% responding “just for fun”, a high of 37.4% aspiring to play at the college level, and a close 33.2% reaching to play professionally. Overall, these results indicate that at a young age a majority of these children are making the decision to participate in youth sports in hopes to increase their skills to reach a higher athletic status and success in their sport(s).

The second research question explored was what are the risks of early sport specialization? Interestingly, most researchers categorize athletes as different levels of specialization. Depending on what category the athletes fall in, increases or decrease their risk(s). While risks could be physical, psychological and/or social, many researchers geared their attention towards the physical aspect. Post et al., (2017) published data that connects highly specialized athletes to an increased chance of injury. Highly specialized athletes were more likely to report overuse injuries and/ or any type of previous injuries. They also found a correlation between hours spent participating in sport increasing likelihood of injuries. If an athlete was participating in more hours than their age in sport, they were more likely to report injuries. Athletes who participated in their main sport for more than 8 months in the year were more likely to report an upper and lower extremity overuse injury. Most importantly, regardless of the sport, compared to athletes who did not reach 8 months of competition in a single sport, the chances of reporting an injury

were 62 percent to 90 percent higher for youth athletes who participate in one sport for more than 8 months of the year (Post et al., 2017). In line with these findings Bell et al., (2016) found a significant connection as well between highly specialized athletes and injuries. Athletes that had a history of an overuse injury were more likely to be categorized as highly specialized. The data in both of these articles support the fact that athletes who trained more than 8 months out of the year were more likely to report a history of any type of knee injury along with overuse, and hip injuries. Buckley et al., (2017) stated that overtraining is a recognized risk factor for youth sports injury, with overuse injuries accounting for up to 54.4 percent of injuries in a standard sports medicine clinic for patients aged 6 to 18. In addition, Jayanthi et al., (2015) concludes that specialized athletes may not be more likely to sustain acute injuries but have an increased chance of sustaining an overuse and/or serious overuse injury and that specialization is an independent risk factor for these types of injuries. Furthermore, Hall et al., (2015) conducted a study of 546 female athletes and found that single-sport athletes had an increased risk of anterior knee pain compared to multisport athletes. These findings support the fact that these young athletes have an immature musculoskeletal system lacking important mechanical properties. By participating in sport(s) year-round, the time required away from these young athletes' bodies needed to rebuild, recover, and/or repair after vigorous activity.

Physiologically, people are not fully developed until late adolescence; yet, these athletes are making decisions and mentally overcapacitating their limits at a young age. These youth athletes are deciding to participate in intensive training at an age where growth, development, and creation of oneself through social experiences is occurring and altering

their identity through social isolation. Excessive psychological stress can be caused by both internal traits such as perfectionism and external factors such as unreasonable expectations set by parents and coaches. These ultimately could lead to ineffective coping mechanisms, a lack of motivation, mood swings, and eventually burnout (Jayanthi et al., 2019). Overall, there was an abundance of data provided proving that specializing in a sport and overtraining at an early age is a big risk for athletes to take when it comes to injuries, burn out, mental health and development.

The third question dissected in this synthesis was, what impact are parents, high school coaches, and club coaches having on sport specialization? It was hypothesized that parents and coaches were going to play a big role in influencing youth athletes to specialize. However, the literature proved this hypothesis to be incorrect, proving these individuals to not be impacting the athlete's decision to specialize. Padaki et al., 2017 conducted a survey asking athletes how often their coach and/or parent told them to not play other sports. On a scale from never to always, 69.4 % said never about their coaches and 78.3% never about their parents, telling them to not play other sports. The results from DiSante et al., (2019) indicated that club coaches were more likely to support specialization than high school coaches. The club coaches view sport specialization as more positive and adaptive practice focused on striving towards elite performance.

Parent's had different responses than the children when asked what factors are important and affect their decisions in participating in youth sports. The two most important factors to them were having fun and being physically active. Having fun had, 44.5% of parents responding "extremely" and 47.5% responding "very". Their least

important factor was the chances of their child receiving a college scholarship, with 30.9 responding “not at all” and 20.9 “a little” (Hernandez et al., 2021).

These results indicate that the parents are more in support of child participating in sport in general versus trying to push them towards athletic excellence. The outcome drawn from the literature is that parents and coaches are not major factors in youth athletes specializing.

Lastly, what beliefs do athletes have about specialization? The answer to this question was interestingly answered by retrospectively having professional and college athletes look back at the decisions they made when they were youth athletes. Martin et al., (2017) had Division I athletes perceive their thoughts on the importance of specialization. Results indicated that while specialization is increasing it is not required for an athlete to achieve elite status. Buckely et al., (2017) similarly conducted a study with high school, college and professional athletes asking them about their perspectives on specialization. When asked to look back, if they were glad, they focused on only one sport at the age they did, 84.2% high school (HS), 83.7% collegiate (C), and 89.4% professional (PRO) had responded yes. When asked if they thought specializing in one sport helps an athlete play that sport at a higher level, 79.7% (HS), 80.9% (C), and 61.7% (PRO) responded yes. Lastly, when asked if they wanted their children to specialize in one sport during their childhood/adolescent year responses were significantly lower, with 30.5% (HS), 27.4% (C), and 22.3% (PRO), answering yes (Buckely et al., 2017).

When comparing these results to current high school athletes’ beliefs, it’s importance to note that there is a difference in what current youth athlete believe compared to their beliefs retrospectively. The results from this literature provide evidence

that while current athletes believe there are many positives to specialization, athletes that had specialized still are glad they had and do believe it helped them play at the next level, yet they would not want their children to do the same.

### **Implications**

Previous research on sport specialization shows that when discussing the issues on this topic researchers results coincide with each other. The result of this synthesis provides information that can be useful to educate athletes, coaches and parents on the common misconceptions and the risks of sport specialization. While there was still information provided in support of specialization the risks outweighed the benefits.

For example, athletes that were classified as highly specialized were more likely to report overuse injuries. Highly specialized athletes are spending more hours and months out of the year participating in their primary sport. The recommendation is that youth athletes participate in sport(s) hours equal to age per week, for example, if a child is seven years old, they should only participate in sport for seven hours a week. Another notable implication from the research is that sport specialization can bring multiple stressors into a youth athlete life that ultimately could lead to affecting their mental health. All this time being put into a single sport is not only increasing risk of injury and impacting mental health but also increasing a children's likeliness to burnout in their sport and even life.

Understanding the importance of factors influencing athletes to participate in sport specializing is important for researchers to understand so they can provide data to properly educate athlete, parents and coaches. It is important that these individuals have

the knowledge while making a decision that can greatly impact the growth and development of themselves/ their children.

### **Recommendations for Future Research**

In reviewing the data base on the issues surrounding sport specialization, the following limitations were noted regarding the studies under review. A limitation to take into consideration is the method used to collect data through self-surveying. By collecting data this way individuals may not be accurately responding to questions. Results in a few studies that included both children and parents had asked to report time spent in sport(s) and had families with different responses. Also, while reporting history of injury children may not remember or fully know the extent of their previous injuries, to eliminate this limitation some researchers had athletic trainers and/ or medical professionals collect and examine this information from the athletes. In many studies, researchers used a selected number of athletes in only a few sports, providing that these athletes may be reporting higher numbers of injury, burnout etc. due to their sports likeness of being more specialized than others. Based on these limitations and other insights related to the literature the following recommendations for future research should be considered:

1. More long-term and longitudinal research needs to be conducted to better compare specialized athletes to multisport athletes in order to confirm the findings dependent on sport specialization
2. A deeper look into mental health, short-term and long-term effects on student athletes and the impact it has on athletes on and off the field

3. Developing a tool/ measurement system to quantify burnout signs over a long period of time with athlete specializing and how it could impact them if they continue into the next level.

### **Summary**

The purpose of this literature review was to determine the issues surrounding sport specialization in youth athletes. Delimiting variables were used to do an exhaustive data-based search which yielded 11 number of articles. These articles were then systematically used to determine the issues surrounding sport specialization in youth athletes. Research revealed that youth athletes that have chosen to specialize are not being pressured by their parents, however, they are being influenced by misleading conceptions of potential perks. Youth athletes are specializing at young ages to increase their athletic performance in hopes to achieve a high athletic status, whether it be high school, college and/ or professional. These common misconceptions are causing more athletes to participate in specialization which is increasing the rates of highly specialized athletes. Athlete's that are highly specialized are more likely to report injuries, overuse injuries, burning out, and mental health effects. Overall, the more research that can be done and provided to student-athletes, parents and coaches on the risk(s) of early sport specialization will help them make an educated choice on if the potential benefits outweigh the very real risk(s).

### References

- Bell, D. R., Post, E. G., Trigsted, S. M., Hetzel, S., McGuine, T. A., & Brooks, M. A. (2016). Prevalence of Sport Specialization in High School Athletics: A 1-Year Observational Study. *The American Journal of Sports Medicine*, 44(6), 1469–1474.
- Brenner, J. S. (2007). Overuse injuries, overtraining, and burnout in child and adolescent athletes. *Pediatrics*, 119(6), 1242+.
- Brooks, M. A., Post, E. G., Trigsted, S. M., Schaefer, D. A., Wichman, D. M., Watson, A. M., McGuine, T. A., & Bell, D. R. (2018). Knowledge, Attitudes, and Beliefs of Youth Club Athletes Toward Sport Specialization and Sport Participation. *Orthopaedic Journal of Sports Medicine*.  
<https://doi.org/10.1177/2325967118769836>
- Buckley, P. S., Bishop, M., Kane, P., Ciccotti, M. C., Selverian, S., Exume, D., Emper, W., Freedman, K. B., Hammoud, S., Cohen, S. B., & Ciccotti, M. G. (2017). Early Single-Sport Specialization: A Survey of 3090 High School, Collegiate, and Professional Athletes. *Orthopaedic Journal of Sports Medicine*.  
<https://doi.org/10.1177/2325967117703944>
- Buhrow, C., Digmann, J., & Waldron, J. J. (2017). The relationship between sports specialization and mental toughness. *International Journal of Exercise Science*, 10(1), 44-52.
- DiSanti, J. S., Post, E. G., Bell, D. R., Schaefer, D. A., Brooks, M. A., McGuine, T. A., & Erickson, K. (2019). Exploring Coaches' Perceptions of Youth Sport

- Specialization: A Comparison of High School and Club Sport Contexts. *Journal of Athletic Training* (Allen Press), 54(10), 1055–1060.
- Hernandez, M. I., Biese, K. M., Schaefer, D. A., Post, E. G., Bell, D. R., & Brooks, M. A. (2020). Different Perceptions of Parents and Children on Factors Influencing Sport Specialization. *Journal of sport rehabilitation*, 1(aop), 1-8.
- Jayanthi, N. A., LaBella, C. R., Fischer, D., Pasulka, J., & Dugas, L. R. (2015). Sports-Specialized Intensive Training and the Risk of Injury in Young Athletes: A Clinical Case-Control Study. *The American Journal of Sports Medicine*, 43(4), 794–801.
- Jayanthi, N. A., Post, E. G., Laury, T. C., & Fabricant, P. D. (2019). Health consequences of youth sport specialization. *Journal of athletic training*, 54(10), 1040-1049.
- Martin, E. M., Ewing, M. E., & Oregon, E. (2017). Sport experiences of Division I collegiate athletes and their perceptions of the importance of specialization. *High Ability Studies*, 28(2), 149-165.
- Myer, G. D., Jayanthi, N., Difiori, J. P., Faigenbaum, A. D., Kiefer, A. W., Logerstedt, D., & Micheli, L. J. (2015). Sport Specialization, Part I: Does Early Sports Specialization Increase Negative Outcomes and Reduce the Opportunity for Success in Young Athletes?. *Sports health*, 7(5), 437–442.
- Padaki, A. S., Popkin, C. A., Hodgins, J. L., Kovacevic, D., Lynch, T. S., & Ahmad, C. S. (2017). Factors that drive youth specialization. *Sports health*, 9(6), 532-536.



**Appendix A  
Synthesis Article Grid**

<b>Author</b>	<b>Title</b>	<b>Source</b>	<b>Purpose</b>	<b>Methods &amp; Procedures</b>	<b>Analysis</b>	<b>Findings</b>	<b>Discussion/Recommendations Research Notes – Commonalities/Differences</b>
Bell, D. R., Post, E. G., Trigsted, S. M., Hetzel, S., McGuine, T. A., & Brooks, M. A.	Prevalence of Sport Specialization in High School Athletics: A 1-Year Observational Study	The American Journal of Sports Medicine	To determine the prevalence of sport specialization in high school athletes. To determine if specialization is influenced by classification method: year in school, sex, and school size. Secondary purpose was to determine if highly specialized athletes would be more likely to report a history of lower extremity injuries.	Survey method. 302 athletes who took the survey. high school athletes between the ages of 13-18 years from two local high schools completed a sport specialization survey and an injury history survey. One large high school with a school	A total of 34.5%, 105 athletes classified as low specialization. 28.8%, 87 athletes classified as moderate specialization and 36.4%, 110 athletes classified as high specialization. schools.	Highly specialized athletes were more likely to report a history of overuse knee or hip injuries. These highly specialized athletes that participated in a single sport for more than eight months per year had reported an observed increased injury risk. Results indicated that athletes at	Self-classification system: a smaller proportion of athletes self-classified as single sport, year in school was not a significant factor, and sex influenced these results. This method was unable to identify any association with injury history.  3-point scale: applied to the same population, a greater proportion of highly specialized athletes were observed, the results were not influenced by sex or year in school, and there was an association between classification category

				enrollment of 2,141 and one small high school with a school enrollment of 603 students. 180 female athletes and 122 male athletes participated.		small school were less likely to specialize to sports compared to athletes at larger. Athletes that were in the high specialization group reported more likely to have overuse injuries. Factors such as school size, sex, and classification method were dependents on the prevalence of sport specialization varied from 22% to 48%.	and reporting a history of knee and hip injuries.  There was not a significant association between the 2 classification methods in this study, using the single sport/multisport self-classification method may underestimate the prevalence of sport specialization.  3-point specialization scale: better represents the prevalence of sport specialization based on its definition as intense, year-round competition in a single sport at the exclusion of other sports.
Brooks, M. A., Post, E. G.,	Knowledge, Attitudes, and Beliefs of Youth Club	Orthopaedic Journal of Sports Medicine	To describe the attitudes and beliefs of youth club sport athletes regarding	Cross-sectional study: questionnaire	45.8% of athletes believed that specialization	Youth athletes in this study have the notion that if	Approximately 39% of all participants were classified as highly specialized. Youth

<p>Trigsted, S. M., Schaefer, D. A., Wichman, D. M., Watson, A. M., McGuine, T. A., &amp; Bell, D. R.</p>	<p>Athletes Toward Sport Specialization and Sport Participation</p>		<p>sport specialization/sport participation and to investigate whether an association exists between the level of sport specialization and the belief in receiving a college scholarship</p>	<p>that focused on attitudes and beliefs toward sport specialization and sport participation. 974 youth athletes, 578 female, 396 males. Athletes had to be between 12 and 18 years old and active in organized sports</p>	<p>increased their chances of getting injured. 91% of athletes believed that specialization increased their chances of getting better at their sport by a great deal. 80.9% of the athletes believed that specialization increased their chances of making their high school team by quite a bit. 66.9% believed it increased their chances of making a college team. Overall, 15.7% of</p>	<p>they specialize in a sport that it increases their sport performance and likelihood of making their high school team and a college team. They also believe they are more likely to receive a college scholarship.</p>	<p>athletes strongly believe that sport specialization is an effective strategy for improving sport performance and attaining various levels of success in sport. Majority of youth athletes do not strongly believe that specialization increases the risk of overuse injuries. Furthermore, the proportion of athletes in this study who believe that they are very or extremely likely to receive a college athletic scholarship is much higher than the National Collegiate Athletic Association (NCAA)–reported. The belief in receiving a scholarship was strongest among highly specialized athletes.</p>
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					athletes believed that they were either “very” or “extremely” likely to receive a college scholarship based on athletic performance. Highly specialized athletes were nearly twice as likely to have a high belief in receiving a college scholarship compared with low-specialization athletes.		
DiSanti, J. S., Post, E. G., Bell,	Exploring Coaches’ Perceptions of Youth Sport	Journal of Athletic Training	To examine the perceptions of coaches in the high school versus club	Cross-sectional survey; 769 coaches	266 female coaches and 503 male coaches.	Club sport coaches were more likely than high	While other articles examined youth athletes’ patterns of specialization and sport participation

<p>D. R., Schaefer, D. A., Brooks, M. A., McGuine, T. A., &amp; Erickson, K.</p>	<p>Specialization: A Comparison of High School and Club Sport Contexts.</p>		<p>sport setting and compare their attitudes and behaviors toward sport specialization.</p>	<p>(497 high school coaches, 272 club sport coaches). Coaches took a survey regarding their perspective of specialization in youth sports. They were also given a questionnaire about their demographic and sports background. The measure for this study was the Youth Sport Specialization Perception Scale, which is a 25-item</p>	<p>Players age coaches ranged from 14-18 years old. Specialization perceptions differed by team sex and sport. School size did not affect specialization perception in the high school coach group. The results were the same with club coaches.</p>	<p>school coaches to favor sport specialization. Athletic trainers in the club sport setting recorded through monitoring coaches attitudes and likeness of training loads lead to clear identification and treatment of overuse injuries. Female athletes self-reported to participate in specialization in sports. Team sex was an influencer of the coach's perception of sport</p>	<p>and attitudes towards specialization in high school athletes and coaches. This article is the first to examine the perception of sport specialization between high school and club coaches using a perceptual scale of their attitudes and beliefs.</p>
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				<p>survey designed to examine the attitudes, beliefs, and values of sport stakeholders related to sport specialization. This scale is a tool that attempts to quantify how sports stakeholders perceive aspects of specializing such as likelihood of maximizing talent, ability to create an enjoyable experience, and pressure from coaches/parents</p>		<p>specialization. Coaches of both high school and club who coached both sexes thought of specialization more positively compared to those that coached just one sex. High school coaches of male sports thought of specialization more positively than female coaches, but club female coaches thought of specialization more positively than male club</p>	
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				nts in a positive or negative fashion. The scale was based on 1-4, 1 being strongly disagree and 4 being strongly agreed. The higher the rating the more favorable attitude towards specializing in a sport.		coaches. School size was a major influence	
Ajay S. Padaki, MD, Charles A. Popkin, MD, Justin L. Hodgins, MD, FRCS	Factors That Drive Youth Specialization	Journal of Athletic Training	The purpose of this review was to survey the available literature on sport specialization in young athletes and its association with mental health, sleep, the drive for success in sport, and burnout.	Surveys were administered to patients and athletes in the department's sports medicine clinic. It was completed	Results showed that the athletes are committing to a single sport before the age of 12. 60% of the athletes played their primary sport	Youth athletes are being influenced to start specializing in a sport even before high school. While aspirations are driving athletes to	Supports the notion that specializing in a sport can lead to burnout, overuse injury and decreased enjoyment.

<p>David Kovacevic, MD, Thomas Sean Lynch, MD, Christopher S. Ahmad, MD</p>				<p>by 235 athletes between 7 and 18 years of age with a mean age of 13.8 plus/minus 3 years. It was board approved that the survey could be given without parental consent or supervision. This was a two-part survey, the first being a section on demographics and the second a section composed of 15 questions evaluating the factors</p>	<p>for 9 or more months of the year, per year. One-third of players were told by a coach to not participate in other sports. 74% of players reported having suffered a sports-related injury.</p>	<p>specialize in sports, extrinsic factors are prevalent as well.</p>	
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				influencing the players participation sport.			
Jayanthi, N. A., LaBella, C. R., Fischer, D., Pasulka, J., & Dugas, L. R.	Early Single-Sport Specialization: A Survey of 3090 High School, Collegiate, and Professional Athletes	The American Journal of Sports Medicine	To determine whether sports specialization, weekly training volumes, and growth rates are associated with increased risk for injury and serious overuse injury in young athletes.	Case-control study. Of 1,214 enrolled, 1,190 athletes participated with 822 being injured and 368 uninjured. Injured athletes between the ages of 7 to 18 years old were selected through two hospital-based sports medicine clinics and compared with healthy controls	Outcomes studied were total injuries, acute injuries, overuse injuries, and serious overuse injuries. . The demographic and current sports specialization survey included information regarding sex, age, organized sports played throughout the year, sports enjoyment, and degree of sports specialization,	Older athletes reported more injuries and more total hours of physical activity and organized sports activity. Calculating age and hours in sports activity a week, sports-specialized training is a proven independent risk for injury. There were 570 overuse injuries with 134 of them being serious, with the most common location of	Surveying like previous articles provided substantial evidence, the difference with this survey is that athletes can take the survey without their parent’s supervision. Medical records were also obtained which gives evidence and history of injuries.

				<p>from an affiliated primary care clinic receiving sports physicals in a three-year time period. Injury details were collected through athlete surveys and electronic medical records. Injuries acquired outside of organized sports were not recorded.</p>	<p>hours per week in organized sports (training and competition), physical education class, and free play. Injured athletes also completed an injury survey to report injury mechanism, training before the injury, and whether the injury was new or recurrent. Additional injury information, such as physician diagnosis, injury type and severity,</p>	<p>injuries being the knee. Other serious overuse injuries included spondylolysis and pars stress injuries to the spine, osteochondritis dissecans, overuse elbow/ligament injuries, and all other ankle, foot, keg and knee stress fractures, as well as individuals classified with a serious overuse injury without a resolved diagnosis.</p>	
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					and treatment, were obtained from medical records.		
Buhrow, C., Digmann, J., Waldron, J. J., Gienau, D., Thomas, S., & Sigler, D.	Early Single-Sport Specialization: A Survey of 3090 High School, Collegiate, and Professional Athletes	International Journal of Exercise Science	To determine the relationship between mental toughness and age of specialization in sport. The second being to determine the differences in mental toughness based on early specialization of sport and gender.	102 Division I college athletes, ages 18-23. 57% female athletes. Survey about specialization and mental toughness, including MeBTough. The mean age of specialization was 13 give or take 4.47 years with a range of 5-19. 63% were starters, 93% were on a full or partial scholarship,	Specialization was determined by a split into equal groups with a median age of 14, athletes that participated and specialized in sports before the age of 14 were considered to experience sport specialization.	No significant difference in mental toughness between those that specialized early and those that did not. There was no difference based on gender either. All athletes of both genders had relatively high levels of mental toughness but is possible due to similar sporting experience to have developed similar levels. This study	This study uses collegiate athletes to determine the effects specializing in a sport in high school had on their mental toughness. Results indicated that there was a lack of specialization at an early enough stage (9years old).

			<p>34% were ever redshirted. A total of 82% of the participants self-reported that they specialized in one sport, but most did not specialize until college. Athletes completed a demographic questionnaire as well as the Mental, Emotional, and Bodily Toughness Inventory (MeBTough). The demographic questionnaire examined the sport experience</p>		<p>suggests that maturity and more competing will help increase mental toughness scores therefore diversification in sport may be beneficial to developing mental toughness.</p>	
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				<p>of the athletes, including collegiate sport, age, year in school, and at what age they experience year-round training of one sport. MeBTough assessed 3 components of mental toughness: mental, emotional, and physical resiliency, Scores ranged from 43 to 172. The higher the score indicates higher levels of mental toughness</p>			
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<p>Martin, E. M., Ewing, M. E., &amp; Oregon, E.</p>	<p>Early Single-Sport Specialization: A Survey of 3090 High School, Collegiate, and Professional Athletes</p>	<p>Journal of Athletic Training</p>	<p>To investigate Division, I athletes' prior sport participation and athletes' perceptions regarding sport specialization</p>	<p>1,041 Division I athletes from three midwestern universities completed self-report surveys. Athletes were split by how much they were receiving through scholarship funding for sport participation with 382 receiving a full scholarship, 384 a partial and 270 no funding. The survey contained questions about demographic</p>	<p>Athletes responded to two questions that assessed their perceptions of the importance of specialization (1) prior to freshman year in high school and (2) at any time during high school. The question read "To what extent do you think that specializing in a sport (before freshman year in high school) and (at any time in high school) is necessary to become a Division I athlete?"</p>	<p>Athletes played many sports in elementary and middle school with participation decreasing during high school. For those athletes who specialized in one sport, specialization occurred typically at the age of twelve and a half. Specialization was dependent on the type of sport. More than half, 777 of the athletes stated they expected to start and play a significant role.</p>	<p>This study supports prior research that early specialization is not a requirement for elite level performance. There were no differences in how early athletes participated in their sport by scholarship status. Unlike other studies this study did show that depending on the sport starting at an early age did make a difference.</p>
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				s, prior sport experience, frequency of participation in sport-related activities, and perception of importance for sports activities and specialization.			
Buckley, P. S., Bishop, M., Kane, P., Ciccotti, M. C., Selverian, S., Exume, D., Emper, W., Freedman, K. B.,	Early Single-Sport Specialization: A Survey of 3090 High School, Collegiate, and Professional Athletes	Orthopedic Journal of Sports Medicine	To retrospectively compare single-sport specialization in current high school (HS), collegiate, and professional athletes with regard to the rate and age of specialization, the number of months per year of single-sport training, and the athlete's perception of injury	Cross-Sectional Study of 3090 athletes completed the survey (503 high school, 856 collegiate, and 1731 professional athletes). The survey was	Continuous data was analyzed using 1-way analysis of variance and continuous variables between groups were compared using Kruskal-Wallis and Mann-	The majority (61.7%) of professional athletes indicated that they believed specialization helps the athlete play at a higher level. Current HS (39.9%) and collegiate athletes (42.1%)	Unlike most of the collected data, this study supports the notion that specializing in a sport does have an impact on greater success of continuing an athletic career.

<p>Hammou d, S., Cohen, S. B., &amp; Ciccotti, M. G.</p>			<p>related to specialization.</p>	<p>administered to athletes at 12 different HSs and collegiate athletes at 2 Division I and 6 Division III colleges that receive care from our practice. Additionally , we surveyed and are the orthopaedic providers for 2 major sports teams in our metropolitan city (Major League Baseball, National Hockey League).</p>	<p>Whitney tests. Categorical variables (all yes/no questions) were compared using chi- square analysis.</p>	<p>recalled a statistically greater incidence of sport-related injury than current professional athletes. Current HS athletes specialized, on average, 2 years earlier than current collegiate and professional athletes surveyed. These data challenge the notion that success at an elite level requires athletes to specialize in 1 sport at a very young age.</p>	
<p>Hernand ez, M. I.,</p>	<p>Different Perceptions of</p>	<p>Journal of Sport</p>	<p>To evaluate the beliefs of youth</p>	<p>1998 participants,</p>	<p>Used a scale of 7, 1-2</p>	<p>Parents and youth athletes</p>	<p>Used similar survey to other articles</p>

<p>Biese, K. M., Schaefer, D. A., Post, E. G., Bell, D. R., &amp; Brooks, M. A.</p>	<p>Parents and Children on Factors Influencing Sport Specialization.</p>	<p>Rehabilitation</p>	<p>athletes and parents on factors related to sport specialization and evaluate the level of agreement between dyads on sports specialization</p>	<p>993 children and 1005 parents took a self-administered survey. Athletes had to be between 12-18 years old and active in organized sport within the 12 months. The survey was divided into four different sections.</p>	<p>(few) 3-5 (some), 6-7 (most). Parents and children were analyzed separately</p>	<p>had differing beliefs on the factors related to sport specialization and answered questions differently. children perceive specialization to be beneficial in making their high school team and receiving athletic college scholarships</p>	
<p>Post EG, Trigsted SM, Riekema JW, Hetzel S, McGuine TA, Brooks MA, Bell DR.</p>	<p>The Association of Sport Specialization and Training Volume with Injury History in Youth Athletes.</p>	<p>Am J Sports Med</p>	<p>To link high levels of specialization with overuse injuries.</p>	<p>Case-control study. 2,011 youth athletes; 989 female and 1022 male between the ages of 12-18. Questionnaire based on</p>	<p>The primary analysis was the comparison of the odds of reporting any previous injury between levels of specialization.</p>	<p>Age and sex influenced specialization with females being more likely to be classified as highly specialized; 53.8% female and 46.2%</p>	<p>The first to observe findings in a broad population-based sample of youth's athletes participating in a wide variety of sports.  Similarities with other articles providing further evidence of the relationship between</p>

				<p>their specialization status, yearly/weekly sport participation volume and injury history. 3-point scale; low, moderate, high. Anonymous questionnaire consisting of demographic information, sport participation, specialization classification, and injury history. Athletes had to report their estimated</p>	<p>The second was comparison of the odds of reporting any previous injury between meet/exceeding volume recommendations and the comparisons of specific injury types or locations between levels of specialization.</p>	<p>male with specialization prevalence peaking at the age of 15. 14.7% reported a history of lower extremity overuse injuries, 5.9% reported upper extremity, 8% reported a history of concussions. Most common overuse injuries were knee, shoulder, ankle, and hip. Athletes who reported overuse injuries participated in their primary sport more months of the</p>	<p>early sport specialization, increased sport training and injuries.</p>
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			<p>average hours per week of their participation in their primary sport, organized sports, and unorganized sports.</p> <p>History of athlete's injuries were grouped into body regions: head/neck, shoulder, elbow, wrist/hand, hip, upper leg, knee, lower leg, ankle and foot.</p> <p>Athletes had to describe the injury, how/ when it</p>		<p>year and participated in more hours per week for both their primary sport and organized sports. The most important finding of this study is that significant associations exist between sport specialization and injury history. The odds of reporting a previous injury were 45% to 91% higher among highly specialized athletes compared with athletes that classified as</p>	
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			<p>happened, and how long they were out for. Athletic trainers reviewed the mechanism of the athlete's injuries to ensure they were being categorized accurately as overuse injuries, acute contact injuries from direct contact, acute non-contact injuries.</p>		<p>low specialization. The odds of reporting a previous injury were 26% to 85% higher in youth athletes who exceed sport volume recommendation compared to athletes who met the timing recommendations.</p>	
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