

Key Factors to Consider in Sport Specialization for Youth: A Review of the Literature

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## **Abstract**

Youth sport provides a valuable environment in which children can develop their motor and psychosocial skills, learn how to be “coached”, and become part of a team (Goodway & Robinson, 2015). This topic is important because decisions to specialize too young can impact the lives of young athletes in terms of their physiological and psychological health. The purpose of this synthesis was to explore the factors that go into the decision to specialize in one sport when children are young.

Ten articles were reviewed and synthesized to answer five research questions. Results indicate that so-called “specializers” may be at a greater risk for physical, psychological, and developmental issues including burnout, overuse injuries, and social isolation. Specialization also may limit long-term motor skill development and inhibit identity and psychological development. Finally, sport dropout is also a major concern with early specialization. Millions of youth in the United States participate in organized sports, yet given their popularity, additional concerns exist relating to high injury rates, lack of coach training, high attrition rates, and an overemphasis on early specialization. Despite low odds that early specialization may lead to athletic scholarships or a professional career, many parents, coaches, teammates, and peers continue to pressure youth to specialize (Russell & Symonds, 2015).

By examining research articles it was evident that specialization can have a huge impact on youth athletes when it comes to the development of their physical, social, and motor skills necessary to achieve success on a daily basis. Due to the overall complexity of this topic, future directions for research have also been provided to fill in the gaps.

## Chapter 1: Introduction

Youth sport participation in the United States is associated with numerous positive health behaviors. In the United States, approximately 30 to 45 million youth age 6 to 18 years of age participate in some form of organized or recreational athletics. This environment provides prosocial characteristics that promote positive values, such as fair play, competitiveness, and achievement, and has been linked to high levels of enjoyment (Russell & Limle, 2013). Many children participate in a variety of sports throughout a given year or across their careers. This is called “diversification” or “sport sampling.”

On the other hand, “specialization” is a growing trend and has been defined as the “limiting of participation to one sport that is practiced, trained for, and competed in on a year-round basis” (Russell, 2013). Youth sport specialization with intense year-round training in a single sport at the exclusion of other sports or activities has been a steadily increasing trend in the United States. As more youth participate in sports, these settings are becoming more structured and adult-organized, and participation begins at earlier ages (Russell, 2013).

Specialization in a single sport before adolescence has been discouraged by the American Academy of Pediatrics, yet research has shown that among youth who specialize, the majority do so before adolescence (Russell & Limle, 2013). There are several reasons why youth may specialize in sport including the potential for scholarships or professional contracts (Hall, Foss Hewett, & Myer, 2015). Parents often believe that by encouraging their children to specialize in one single sport at an early age, the child will be more likely to obtain a college athletic scholarship or even become an elite athlete, yet this is not supported by most research studies or data. National Collegiate Athletic Association data indicate that high school seniors’ probability of playing varsity collegiate sports ranges from 2.9% (basketball) to 12.9% (ice hockey), while

the odds of transitioning from college to professional sports are even lower. Yet despite such odds, many youth are still pressured by their parents, coaches, and mentors to specialize in one sport (Russell, 2013).

Russell (2013) presents various concerns that exist regarding the physical and physiological development of youth who specialize in one sport. So-called “specializers” may be at a greater risk for physical, psychological, and developmental issues including burnout, overuse injuries, and social isolation. Specialization may also limit long-term motor skill development, and inhibit identity and psychological development. Finally, sport dropout is also a major concern with early specialization. Millions of youths in the United States participate in organized sports, yet given their popularity, additional concerns exist relating to high injury rates, lack of coach training, high attrition rates, and an overemphasis on early specialization. Despite low odds that early specialization may lead to athletic scholarships or a professional career, many parents, coaches, teammates, and peers continue to pressure youth to specialize (Russell & Symonds, 2015).

To specialize early or late in sports participation is a topic that is under debate by many today (Russell & Symonds, 2015). Early specialization is characterized as engaging in one single sport at a very young age, typically around the years of five and eight years old. Late specialization is characterized as engaging in one single sport later on in a sport career, typically around the ages of 12 and 15. Many reasons exist for early specialization including parental expectation, pursuit of scholarships, stories of elite athletes who develop expertise, pressure from coaches, and an athletes’ desire to succeed in their sport. Russell (2013) states that the pros of early specialization include better coaching and skill instruction, enhanced skill acquisition through deliberate practice accumulation, improved time management, and diverse peer

relationships within a group. Meanwhile, the cons of early sport specialization include risk for overuse injury, cost development of lifetime sports skill, burnout to include emotional and physical exhaustion, and social development issues. Meanwhile, pros of late specialization include development of pro social behaviors, development of intrinsic motivation, improved motor skill development, an increased connection to community, integration of family, and better health outcomes. The cons of late specialization include a time burden and financial demands on family members (Sluder, Fuller, Griffin, & McCray, 2015).

Youth sport provides a valuable environment in which children can develop their motor and psychosocial skills, learn how to be “coached”, and become part of a team. Goodway and Robinson (2015) argue that constructive participation in youth sport should be an important part of every child’s upbringing and a medium through which key developmental processes occur. In contrast to this view, others familiar with this topic will argue that youth sports have undergone professionalization that is counterproductive to healthy child development and disadvantages the majority of children who will never go on to be elite athletes. There is clearly a debate within the youth sport community regarding sport specialization vs. a multisport approach (diversification) and between early + late specialization. This is one of the many reasons why the topic of specialization within youth sport is so intriguing and continues to be a hot topic of discussion.

This topic is important because decisions in this area can impact the lives of young athletes in terms of their physiological and psychological health. It’s important for our youth and their families to have an understanding for the issue, including the pros and cons of engaging in both statuses, the socioeconomic issues involved in specializing, as well as the current trends within specialization in youth sport (Goodway & Robinson, 2015). By encouraging young athletes and their families to be informed regarding the topic of specialization, the hope is that

they'll be able to make the proper decisions regarding specialization to allow for a successful athletic career and healthy lifestyle as they transition into young adults. The purpose of this synthesis is to explore the trends and factors involved in sport specialization for youth.

**Assumptions:**

- It was assumed that all subjects were honest in following necessary research protocols.
- It was assumed that all instruments used within the studies were validated and produced reliable measures for the studies.
- It was assumed that both ethical and proper practices were used within all phases of the research studies.

**Delimitations:**

- All article reviews were written in the last ten years (2008-2018).
- All articles examined the early or late specialization status of adolescents, youth athletes, and teens.
- All articles were peer reviewed, data based, and provided a relevant contribution of information to the research questions.

**Limitations:**

- This synthesis does not have equal representation of male and female youth athletes because most studies focused on males.
- This synthesis focuses primarily on teens, adolescents, and young adults.
- This synthesis is limited to certain geographical regions of the country, as most studies were conducted in the Midwest of the United States of America.

**Research Questions:**

1. What are the current trends in sport specialization?
2. What are the physical/physiological factors to consider in sport specialization?
3. What are the psychological/emotional factors to consider in sport specialization?
4. What are the socioeconomic factors impacting the choice to specialize?
5. Is early vs. late specialization more beneficial for youth athletes?

**Operational Definitions:**

1. Specialization- The limiting of participation to one sport that is practiced, trained for, and competed in on a year-round basis (Russell, 2015).
2. Early Sport Specialization- Sports in which early sport-specific training (by ages 5 to 8) is necessary for future excellence. Implies a focused involvement in one sport and a large number of hours of deliberate practice with the goal of improving sport skills and performance outcomes during childhood (Goodway & Robinson, 2015).
3. Late Sport Specialization- The intensive year-round training in a single sport at the exclusion of other sports, typically seen at the ages of 12 to 15 years old (Goodway & Robinson, 2015).
4. Burnout- Physical/emotional exhaustion demonstrated by sport devaluation, and reduced athletic accomplishment (Goodway & Robinson, 2015).
5. Adolescent- A young person in the process of developing from a child into an adult (Russell, 2015).

6. Intrinsic Motivation- Behavior that is driven by internal awards where the motivation to engage in a specific behavior arises from within the individual because it is naturally satisfying. (Russell & Limle, 2013).
7. Extrinsic Motivation- Behavior which is driven by external rewards such as money, fame, grades, and praise (Russell & Symonds, 2015).
8. Sport Sampling- Engaging in a variety of different sports during the formative youth sport years with the ultimate goal of learning skills and having fun (Goodway & Robinson, 2015).
9. Overuse Injuries- Any type of muscle or joint injury, such as tendinitis or a stress fracture, that's caused by repetitive trauma (Smith, 2015).
10. Organized Youth Sports- Refers to all types of adult-structured competitive sports provided for children and adolescents, which vary from recreational to extremely competitive (Russell & Limle, 2013).
11. Overtraining- Constant intense training which does not provide adequate time for recovery (Russell, 2015).
12. Sport Diversification/Generalization- Participation in a variety of different sports before deciding to concentrate all efforts on the pursuit of elite performance in one single sport (Sluder, Fuller, Griffin, & McCray, 2015).

## Chapter 2: Methods

The purpose of this chapter is to identify specific methods used to gather and organize the articles comprising the critical mass. This chapter will present the following topics: Data collection, data analysis, data categorization, and data coding. The articles identified utilized either quantitative or qualitative research measures, with a few that included mixed methods. Keywords used for literature searches, search engines, and instruments used and described in detail, are discussed within this chapter.

### Data Collection:

Eligible articles for this synthesis include studies from peer-reviewed, academic journals with English language, and range from 2008 to 2018 in publication, all from either EBSCOhost (Sport Discus), The Physical Education Index, and Google Scholar. Keywords for the research included “*physical activity*”, “*motivation*”, “*specialization*”, “*youth sport*”, “*adolescent*”, “*teenager*”, “*young adults*”, “*importance*”, and “*barriers*.” All together 15 articles were synthesized with all articles being gathered from research conducted in the United States of America. Each article chosen presented important information relative to the title and research questions of this synthesis. The main basis for acquiring the 15 articles was finding material that assisted with the process of appropriately answering the five research questions.

The process of developing a critical mass began with “sport specialization” as the initial keywords. Using the search engine SportDiscus (EBSCOhost), there were 439 peer-reviewed, English language specific, academic journals ranging from 2008-2018. “Youth sport” were the next keywords entered into the data base as the number of articles now decreased to 58. The final sequence of keywords entered into the data base included “teenagers or adolescents or young

adults”, which as a result further decreased the search results to 16 articles. The 11 articles selected from this database were chosen based on the parameters of this search, and investigated criteria which would be beneficial and of assistance in answering the five research questions within this study.

When the keyword “trends” was entered as the initial keyword within SportDiscus (EBSCOhost) followed by “specialization” and “youth or adolescents or young people or teens or young adults”, only five articles fit into the previous criteria established within the delimitations. However, one new article was found to be useful which made it a plus. This particular article examined the idea of early vs. late sport specialization which aligned with research question number five.

While examining the Google Scholar database, a similar process was used which produced very beneficial results. The keywords used within the database included “Specialization in Youth Sports” and the custom range entered ranged from 2008 to 2018. After entering the parameters of the search, about 69 results were produced. The difficult part about this database is that it’s difficult to determine whether an article is peer-reviewed or not, so going through each article to ensure that it would be a reliable source of information for this study was a significant task. Four additional articles were found useful and immediately entered into the critical mass. By carefully examining each result displayed from the keywords, the most important criteria within each article was ensuring that there was an aspect which could be used to answer at least one of the five research questions within this study. A goal was to try to find an equivalent number of articles to support each research question, which appears to have been achieved within the initial research process.

### **Journals:**

The articles for this synthesis were acquired from the following journals: *Journal of Sport Behavior* (Russell and Limle, 2013), *Sports Health: A Multidisciplinary Approach* (Jayanthi et al., 2018), *Journal of Sport Behavior* (Russell, 2014), *Athletic Insight* (Russell and Symonds, 2015), *Kinesiology Review* (Goodway and Robinson, 2015), *Journal of Sport Rehabilitation* (Hall et al., 2015), *Strength and Conditioning Journal* (Blagrove et al., 2017), *The Physician and Sports Medicine* (Pasulka et al., 2017), *The American Journal of Sports Medicine* (Bell et al., 2016), *Kinesiology Review* (Smith, 2015), *International Journal of Sports Physical Therapy* (DePhillipo et al., 2018), *GAHPERD Journal* (Sluder et al., 2017), *Journal of Youth Sports* (Christianson and Deutsch, 2012), *Pediatric Exercise Science* (Williams, 2018), *Athletic Training & Sports Health Care: The Journal for the Practicing Clinician* (Callender, 2010), *Missouri Journal of Health, Physical Education, Recreation & Dance* (White and Oatman, 2009), *Physical Education & Sport Pedagogy* (Wall and Cote, 2008).

### **Data Analysis:**

Of the articles within the critical mass, ten were qualitative, three were quantitative, and two utilized mixed methods. The initial quantitative article (Russell & Limle, 2013) utilized an instrument called the Physical Activity Enjoyment Scale (PACES) designed to assess the extent to which an individual experiences a particular physical activity as enjoyable. For example, participants are asked to respond to how they feel about physical activity using bipolar adjectives such as “I enjoy it – I hate it,” “It’s very invigorating – it’s not at all invigorating,” and “It’s very pleasant – it’s very unpleasant.”

The third overall article, and second quantitative (Russell, 2015) incorporated this same 18-item with bipolar adjectives in a seven-point semantic differential format and assesses the degree to which an individual experiences physical activity as enjoyable. The next article (Russell & Symonds, 2015) examined how the recall of former youth athletes' motivation and motivational climate differed by whether they specialized in one sport, and perceptions of the youth sport experiences of 226 undergraduates (M age = 19.55, SD = 1.27) were assessed by pencil and paper surveys. Questions on surveys related to current exercise and sport participation, youth sport motivations, and youth sport motivational climate perceptions.

The next article (Goodway & Robinson, 2015) examined three developmental frameworks (Mountain of Motor Development, Developmental Model in Sport Participation, Spirals of Engagement Trajectory Model) to make the case that a broad base of fundamental motor skill competence is necessary in the early years before sport specialization in the adolescent years. Hall, Barber, Hewett, & Myer (2015) developed a Retrospective cohort epidemiology study to determine if sport specialization increases the risk of anterior knee pain in adolescent female athletes. Testing consisted of a standardized history and physician-administered physical examinations to determine the presence of PFP. Blagrove, Bruinvels, & Read (2017) looked specifically at adolescent female athletes who train excessively and adopt poor diets, as well as the risk of the female athlete triad, overuse injury, mental health issues, and over-training.

Pasulka, Jayanthi, McCann, Dugas, & LaBella (2017) conducted a clinical case-control study where injured athletes (seven to eighteen years) were recruited from sports medicine clinics and compared to similarly aged uninjured athletes recruited from primary care clinics. Participants completed a survey reporting age, gender, sport type, specialization patterns, and

details regarding sports-related injuries in the previous 6 months. Clinical diagnoses were collected from patients' medical records. Injuries were classified as acute, overuse, or serious overuse. Bell, Post, & Trigsted (2016) conducted a cross-sectional study where high school athletes between the ages of 13 and 18 years old from two local high schools completed both a sport specialization survey and an injury history survey. Athletes were classified into low, moderate, or high specialization groups using a recently developed 3-point system and were classified using a self-classification instrument.

Smith (2015) provided a historical overview of the practice of early sport specialization, as well as the pros and cons which can be seen within this status. Methods used within this article included observation, surveys, and field notes. DePhillipo, Cinque, Kennedy, Chahla, Moatsche, & LaPrade (2018) conducted a case report with the purpose of describing patella-femoral articular cartilage defect of the knee in a preadolescent skier due to overuse and repetitive microtrauma as a result of ESS. Sluder, Fuller, Griffin, & McCray (2018) analyzed the pros and cons of early vs. late specialization, as well as the reasons why youth athletes may engage in either status. They collected and analyzed data by conducting a case report on a healthy eleven year old male competitive alpine skier presented with recurrent swelling of his right knee and persistent anterior knee pain while skiing without evidence of any specific history of injury or traumatic event. Christianson and Deutsch (2012) analyzed the positive and negative psychological, physiological, bio-mechanical, and motor development implications of early sport specialization in correlation with the use of a "deliberate practice regimen." Williams (2018) focused on the importance of training loads for adolescent athletes, which is still one of the most frequently asked questions from parents and coaches. Methods used included surveying coaches and athletic administrators throughout the country. Callender (2010) looked specifically at the

pros and cons of early specialization while conducting an observation and field notes at a middle school in the Midwest of the United States.

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

The purpose of this chapter is to illustrate the purpose, data collection, and results of findings from the critical mass of articles used in this synthesis. Articles have been categorized in relation to their particular specialization status and the importance of youth sport across a variety of age groups: Youth (ages 1 to 12), Adolescence (ages 13-20), and Young Adult (ages 21-30). The categories are “Athletes’ Sport Motivation and Motivational Climate to Specialize”, “Analyzing a Particular Specialization Status”, and “Acknowledged Risks Regarding Specialization Status.” There were a list of articles for each category, analyzing a particular specialization status, and illustrating either the athletes’ sport motivation or motivational climate for specializing in youth sport.

#### **Athletes’ Sport Motivation and Motivational Climate to Specialize**

Presenting a study on sport motivation within youth athletes, Russell (2015) examined how former youth athletes’ sport motivation and current exercise and sport participation was related to whether or not they specialized in one youth sport. Two-hundred undergraduates were surveyed on perceptions of their youth sport experience. Participants were surveyed on their reasons for youth sport participation, current sport and exercise participation, physical activity enjoyment (Physical Activity Enjoyment Scale), and youth sport motivations (Sport Motivation Scale). Participants consisted of 93 males (M age = 19.41 years, SD = 1.36) and 107 females (M age = 18.81 years, SD = 1.09 years) through general education wellness courses offered at a mid-size Midwestern university. Participants ranged in age from 17 to 22, with a mean age of 19.09 (SD = 1.26). The sample was largely Caucasian (78%) followed by African American (16%), Asian (4%), American Indian (2%), and Hispanic (1%). The rationale for surveying students from general education courses was to obtain a more representative sample. All students,

regardless of major, were required to enroll in these courses, therefore minimizing selection bias due to over-representation of majors with a larger percentage of college athletes (e.g. physical education) (Russell, 2015). Participants signed consent forms before completing surveys and names were not included on the surveys, thus maintaining their anonymity. Participants completed a survey packet which included demographic information, whether they specialized in a single youth sport (in response to whether or not they limited their athletic participation to one sport which was practiced, trained for and competed in throughout the year), their current general sport participation classification (competitive, recreational, do not participate), and questions about current aerobic exercise and resistance training frequency. In addition, a set of items was developed which examined participants' reasons for participating in youth sport. The scope of these items was based on noted reasons for youth sport participation and withdrawal. These nine items, which were set to a five-point Likert Scale (1 = Strongly Disagree, to 5 = Strongly Agree), were (1) to have fun, (2) to win, (3) to do something I was good at, (4) to stay in shape, (5) to learn and improve skills, (6) to play as part of a team, (7) to be recognized as an athlete by my peers, (8) to be promoted to the next level in my sport, and (9) to feel competent about my physical abilities (Russell, 2015).

The Physical Activity Enjoyment Scale (PACES) is an 18-item scale with bipolar adjectives in a 7-point semantic differential format and assesses the degree to which an individual experiences physical activity as enjoyable. For example, participants were asked to respond to how they feel about physical activity using bipolar adjectives such as "I enjoy it – I hate it"; "It's very invigorating – it's not at all invigorating"; and "It's very pleasant – it's very unpleasant." The Sport Motivation Scale (SMS) assesses intrinsic motivation, extrinsic motivation and amotivation in sports. Three types of intrinsic motivation (IM) are measured with

the SMS: IM to Know, IM to Accomplish Things, and IM to Experience Stimulation. IM to know refers to performing an activity for the pleasure and satisfaction gained while learning, exploring, or understanding something new. Motivation towards accomplishments is similar to mastery motivation and task-orientation. IM to experience stimulation refers to engaging in an activity to experience stimulating sensations. The three types of extrinsic motivation (EM) assessed with the SMS are: EM – External Regulation, EM – Introjection, and EM – Identification. External regulation refers to behaviors that are controlled by external factors such as rewards. Introjection refers to behaviors that are regulated by internal pressures such as guilt or anxiety. Lastly, identifications refers to behaviors that are internally regulated and self-determined because one views the behavior as important, yet it is still performed for extrinsic reasons. The SMS consists of 28 items and participants responded to items based on a 7-point Likert scale ranging from “strongly agree” to “strongly disagree.” The SMS anchor read as follows, “Why did you practice for youth sport(s)?” (Russell, 2015).

Results show that “specializers” participated in youth sport more than “non-specializers” to stay in shape, learn skills, and feel competent about their physical abilities. Specializers were also less likely to participate in sport as young adults, and were higher on IM-Know and EM-Introjected Regulation than non-specializers (Russell, 2015). A majority (113 or 56%) of participants reported specializing in a single youth sport, and the sports of basketball (n = 25), softball (n = 17), soccer (n = 14) and football (n = 12) accounted for 73% of all sports that participants reported they specialized in as youth athletes. Specializers were also asked to recall the age they began specializing and 101 (89%) indicated they began specializing before adolescence. In fact, 72 (71%) of all self-reported specializers reported beginning their specialization before the age of ten and the most frequent self-reported age of specialization was

six years old (21%). When asked to classify their current participation status in sport, 30 participants (15%) were currently competitive participants, 67 participants (33.5%) were recreational participants, and 103 participants (51.5%) no longer participated in sport (Russell, 2015). Those participants who indicated they were no longer active in their sport participation were asked to provide the reasons for their sport discontinuation. Of 103 participants who reported they no longer participated in sport as young adults, specializers' main reasons were (1) lack of time ( $n = 17$ ), (2) lost interest ( $n = 12$ ), and (3) lack of fun ( $n = 10$ ), whereas nonspecializers' main reasons were (1) lost interest ( $n = 10$ ) and (2) lack of time ( $n = 8$ ) (Russell, 2015).

Results indicated that the first hypothesis that specializers would report lower intrinsic motivation and higher extrinsic motivation than non-specializers was partially supported (Russell, 2015). Specializers were significantly higher on EM-introjected regulation compared to non-specializers, but were also significantly higher on IM to know than non-specializers, which was unexpected. The second hypothesis, that specializers would report lower physical activity enjoyment compared to non-specializers, was not supported as there were no differences in physical activity patterns or enjoyment levels between specializers and non-specializers. The third hypothesis that specializers would be more likely to report they did not actively participate in sport as young adults compared to non-specializers was supported, indicating that youth sport specializers were less active in sport participation as young adults compared to non-specializers. This finding supports that youth sport specialization may have negative effects on long-term participation. In addition, this finding may be more important to remember when examined in the context of motivational differences between specializers and non-specializers (Russell, 2015).

Russell and Symonds (2015) sampled 226 participants (85 males and 141 females) who participated in some form of organized youth sport through wellness and leisure courses at two mid-size universities in the U.S. Participants completed surveys in their courses at the beginning of class which included demographic information, whether they specialized in a single youth sport (in response to whether or not they limited participation to one sport which was practiced, trained for and competed in throughout the year), their current general sport participation classification (competitive, recreational, do not participate), and questions on current aerobic exercise and resistance training frequency. In order to assess retrospective perceptions of the motivational climate on their youth sport teams, participants completed the Perceived Motivational Climate in Sport Questionnaire-2. This assesses an individual's perceptions of the degree to which their team's motivational climate is characterized in terms of two higher order dimensions (task and ego-involving climate), which are composites of six underlying characteristics. The Sport Motivation Scale (SMS) was also incorporated into the study.

Results showed that of the sample ( $N = 226$ ), 143 (63%) participants reported specializing in one youth sport, with basketball ( $n = 35$ ), softball ( $n = 22$ ), soccer ( $n = 19$ ), and volleyball ( $n = 15$ ) accounting for 64% of specialized sports. Specializers were also asked to recall the age at which they began specializing, and 132 (92%) reported that they began specializing before adolescence (age 13), with 83 (58%) beginning their specialization before the age of ten. Overall, the mean age of self-reported specialization was 8.46 ( $SD = 3.02$ ) years. When asked to classify their current sport participation status, 28 participants (12.4%) were currently competitive, 90 (39.8%) were recreational, and 106 (46.9%) were no longer active in sport. When examining physical activity patterns as young adults across specialization status, separate independent t-tests comparing current exercise frequency between specializers and non-

specializers were nonsignificant for both aerobic exercise frequency and strength training frequency (Russell & Symonds, 2015). The above findings are important due to the alarming rate of athletes (46.9%) that reported as specializers at a young age but are no longer active within their previous sport, perhaps indicating that they have experienced some of the many negative consequences which go along with engaging in early specialization.

Jayanthi, Holt Jr., and Labella (2018) examined the socioeconomic factors for sport specialization and injury in youth athletes. The effect of socioeconomic status (SES) on rates of sports specialization and injury among youth has not been described previously, however, through a cohort study of level three evidence there were some very interesting findings relating to this topic. Injured athletes aged seven to eighteen years were recruited from two hospital-based sports medicine clinics and compared with uninjured athletes presenting for sports physicals at primary care clinics between 2010 and 2013. Participants completed surveys on training patterns and electrical model records provided injury details as well as patient zip code, race, and health insurance type. SES was estimated from zip codes and the sample was divided into SES tertiles. Analysis of variance and multivariate regressions were used for continuous variables, and multivariate logistic regression analyses were conducted to explore relationships between risk factors and injury (Jayanthi et al., 2018).

Of the 1190 athletes surveyed, 1139 (96%) had SES data which was considered appropriate for use within the study. Compared with low-SES athletes, high-SES athletes reported more hours per week spent playing organized sports, trained more months per year in their main sport, were often highly specialized, and had increased participation in individual sports. The proportion of athletes with a greater than 2:1 ratio (weekly hours in organized sports to free play) increased with SES. Accounting for age and weekly organized sports hours, the

odds of reporting a serious overuse injury increased with SES. High-SES athletes reported more serious overuse injuries than low-SES athletes, potentially due to higher rates of sports specialization, more hours per week playing organized sports, higher ratio of weekly hours in organized sports to free play, and greater participation in individual sports (Jayanthi et al., 2018).

### **Analyzing a Particular Specialization Status**

Russell and Limle (2013) conducted a study with the purpose of asserting whether youth sport specialization and retrospective recall of youth sport experiences were related to perceptions of and participation patterns in sport and physical activity as young adults. A substantial proportion of participants (76%) reported specializing in one of five team sports: basketball, soccer, softball, football, or baseball. Young adults' physical activity enjoyment was not influenced by whether they specialized in a single sport as youth. In addition, self-reported exercise frequency (aerobic exercise and resistance training) in young adulthood was not influenced by whether particular participants specialized in a single sport as youth. However, those who specialized in a single sport as youth were less likely to actively participate in sport as a young adult. This result supports previous findings that youth sport specialization may have detrimental implications for long-term sport involvement. In addition, participants' perceptions of their youth sport experience predicted physical activity enjoyment as a young adult, regardless of whether or not they specialized in a single sport. Specifically, more positive perceptions of youth sport were associated with greater physical activity enjoyment increased as young adults (Russell & Limle, 2013).

When referencing Russell and Limle (2013), the current findings represent several interesting insights into young adults perceptions of their youth sport experiences, physical activity, and sport behavior patterns. While young adults' physical activity enjoyment was not

related to sport specialization in youth, overall perceptions of youth sport experience appeared to be related to physical activity enjoyment in young adults. This finding supports the stance that positive youth sport experiences along with early sport diversification can assist with avoiding burnout and lost interest in sport. Neither young adults' physical activity enjoyment or exercise frequency were influenced by specialization status. However, the hypothesis that young adults who specialized in one sport in their youth would report lower participation in sport as young adults was supported. These findings may express a combination of developmental and motivational factors characteristic of specialized sport settings which can lead to different participation rates as young adults (Russell & Limle, 2013).

Based on this research, young adults' sport participation patterns appear to be associated with their sport specialization status as youth athletes. Those who specialized at a young age appear to be much more prone to the effects of overuse injuries, burnout, and mental exhaustion. This has been shown in the declining percentages of youth specializers who still participate in the sport they engaged in growing up, or even those who still participate in recreational sports. Meanwhile, those who were either multi-sport athletes growing up or late specializers appear to have much stronger sport participation patterns due to avoiding the many consequences which come along with engaging in early specialization (Russell & Limle, 2013).

White and Oatman (2009) administered a descriptive survey to collegiate football and field hockey players with the goal of determining whether specializing in team sports during childhood can translate into a successful collegiate athletic career. The survey consisted of twelve questions with two parts to each question. The first part of the survey requested demographic information from the subjects which included their total years of playing sports, current sports participation, scholarship status, gender, age, and year of college. The second part

requested the participants' perceptions concerning specialization in sports during childhood, ages best suited for specialization, benefits of specialization, risks of specialization, and the importance of specialization. Overall, there were 71 participants from football and field hockey who were selected from a pool of 254 student-athletes at a Midwestern University. In order to obtain a diverse pool, the participants varied in age, gender, years in college, and total years of playing sports. A majority of the participants (77%) were male compared to 23% who were female, and the majority of the participants were around 20 years old and in either their first or second year of college (White & Oatman, 2009).

According to White and Oatman (2009), results showed that many people perceive collegiate athletic success based on whether or not an athlete receives a scholarship. In this particular study, 38% of the participants had a partial scholarship while 42% had a full scholarship. It was also found that the participants averaged between 12 and 14 years of sports competition with a starting age hovering around seven or eight years old. 24% of the athletes did not start playing sports until they were between the ages of 9 to 12+ years of age. The most significant finding which can be taken from this information is that you don't necessarily have to start playing sports when you're three or four years old in order to achieve success. It was also found that the average number of sports played prior to high school was four sports and that 83% of the sample played at least three or more sports prior to high school. Once again, this implies that the athletes surveyed participated in a wide variety of sports while growing up and it does not appear that specialization in their childhood years played a role in their ability to achieve collegiate success. In fact, only 2.8% of the total sample were found to have specialized within their youth years (White & Oatman, 2009).

The reason why this study was important is because it does a great job of showing how a wide variety of multi-sport athletes were able to achieve collegiate success despite not giving in to the common thought that early specialization is needed in order to achieve elite success. The fact that 83% of the sample played three or more sports and were still able to successfully compete in a collegiate sport tremendously supports the notion of encouraging our youth athletes to play multiple sports in their early years so they can become well-rounded individuals. Perhaps the most compelling quote within the entire article reads as follows, “If the main purpose of sports is to learn how to work hard, to learn the importance of teamwork, to learn discipline, and to have fun, children at young ages should learn the fundamentals of various sports and just enjoy playing sports” (White & Oatman, 2009). Overall, the hope of the authors for the future is that an increasing number of coaches, parents, and players realize that children will benefit the most from the experience of learning and participating in a wide variety of sports.

Hall, Foss, Hewett, and Myer (2015) sought to determine whether sport specialization leads to an increased risk of anterior knee pain in female athletes within the adolescent age range. A total of 546 female athletes from three different sports (basketball, soccer, and volleyball) were observed within the study, all of whom were pulled from five middle schools and four high schools within the Kentucky area. Throughout the study each athlete was asked to state their current participation within sport and how many total years they had participated within their sport in either a recreational or scholastic setting. By answering these two questions each athlete was able to be placed into either the sport-specialized or the multi-sport group. Testing began with the completion of the AKPS which tested pain within each athlete, followed by the IKDC form which was completed and measured the pain levels, symptoms, function, and sports activity present within each subject. Lastly, each subject underwent an evaluation from an

on-site physician where they looked at specific areas where tenderness or anterior knee pain can be found within adolescent female athletes (Hall et al., 2015).

Results of these studies suggested that there is indeed an increased risk within single-sport female athletes compared to multi-sport female athletes when it comes to common diagnoses such as Sinding Larsen-Johansson and Osgood Schlatter disease. However, results also showed that other specific anterior knee pain diagnoses such as fat pad, plica, trauma, and tendonitis were not significantly different between single-sport and multi-sport athletes. It's important to note that single-sport athletes had an average age of 14.5 which was older than the multi-sport athletes, as well as an average height and weight which were both greater than the multi-sport athletes. This could potentially provide an insight into the sport-selection process of the single-sport and multi-sport athletes who were observed within this study, which as a result could prove to be very informative moving forward (Hall et al., 2015).

Sluder, Fuller, Griffin, and McCray (2015) analyzed the idea of early vs late specialization within youth sport by digging deeper into the pros and cons of engaging in both statuses. For example, the pros of engaging in early sport specialization which they listed included effective coaching and skill instruction, enhanced skill acquisition due to an increased focus within that sport, improved time management skills, and developing effective relationships with peers by spending an increased amount of time with them. Meanwhile, cons of early sport specialization included the common risk of developing an overuse injury, the increased risk of physical and emotion burnout/exhaustion, as well as the stunting and limitation of social skills. Pros of late sport specialization included the improved development of both personal and social behaviors, the promotion of intrinsic motivation and motor skill development, as well as an

overall better health outcome. Meanwhile, the only cons which were listed for late sport specialization included financial and time burdens (Sluder et al., 2015).

The reason this article was so important is because it does a great job of diffusing the common belief among parents that the only way their child is going to receive a scholarship or achieve elite-status within sport is by specializing at an early age. The truth of the matter is that elite athletes tend to play multiple sports growing up so they can become well-rounded individuals who don't begin thinking about specialization until 12-15 years of age. In fact, a study conducted by the NCAA on Division I athletes showed that 70% did not specialize in their respective sport until they were at least 12 years of age, and 88% considered themselves to be multi-sport athletes. The study also showed that athletes who engaged in early sport specialization and exceeded a sports training ratio of 2:1 (training to rest days) were more likely to suffer from overuse injuries and the effects of mental burnout (Sluder et al., 2015). The results of this study further justify the current global suggestion that youth athletes should be encouraged to participate in multiple sports at a young age instead of being pressured into specializing in one single sport.

### **Acknowledged Risks Regarding Specialization Status**

Pasulka, Jayanthi, McCann, Dugas, and LaBella (2017) observed current trends among youth athletes towards earlier specialization age and year-round training on multiple teams and the concerns that have been raised regarding increased injury risk. The goal of their research was to determine whether sports specialization and injury patterns vary by sports type. Of 1,190 athletes enrolled, 26% (313) were single-sport specialized (reported participation in one sport and trained >8 months/year). Sports with the highest proportion of single-sport specialized athletes were tennis (46.7%), gymnastics (30.1%), and dance (26.3%). Single-sport specialized

athletes in individual sports started specializing at a younger age ( $11.2 \pm 2.4$  vs.  $12.0 \pm 2.7$ ,  $p = 0.05$ ) and reported higher training volumes ( $11.8$  vs.  $10.3$  h/week,  $p = 0.04$ ) than those in team sports. Sports with the youngest specialization age were gymnastics ( $8.9 \pm 1.7$ ), dance ( $10.8 \pm 3.0$ ), and soccer ( $10.9 \pm 2.4$ ). Single-sport specialized athletes in individual sports accounted for a higher proportion of overuse injuries ( $44.3\%$  vs  $32.2\%$ ,  $OR = 1.67$ ,  $p = 0.037$ ) and serious overuse injuries ( $23.4\%$  vs  $11.6\%$ ,  $OR = 2.38$ ,  $p = 0.011$ ), but a lower proportion of acute injuries ( $28.8\%$  vs  $13.8\%$ ,  $OR = 0.37$ ,  $p = 0.001$ ) compared to single-sport specialized athletes involved in team sports (Pasulka et al., 2017). Athletes in individual sports may be more likely to specialize in a single sport than team sport athletes. Single-sport specialized athletes in individual sports also reported higher training volumes and greater rates of overuse injuries than single-sport specialized athletes in team sports (Pasulka et al., 2017).

Bell, Post, and Trigsted (2016) were looking to determine the prevalence of sport specialization in high school athletes and determine if specialization is influenced by classification method, year in school, sex, and school size. A secondary purpose of theirs was to determine whether highly specialized athletes would be more likely to report a history of lower extremity injuries.

A total of 302 athletes completed surveys and were classified as low specialization ( $n = 105$ ,  $34.8\%$ ), moderate specialization ( $n = 87$ ,  $28.8\%$ ), or high specialization ( $n = 110$ ,  $36.4\%$ ). Athletes from the small school were more likely to be classified in the low specialization group (low,  $43\%$ ; moderate,  $32\%$ ; high,  $25\%$ ) compared with those from the large school (low,  $26\%$ ; moderate,  $26\%$ ; high,  $48\%$ ) ( $P < .001$ ). Athletes in the high specialization group were more likely to report a history of overuse knee injuries ( $n = 18$ ) compared with moderate ( $n = 8$ ) or low specialization ( $n = 7$ ) athletes ( $P = .048$ ). Athletes who trained in one sport for more than 8

months out of the year were more likely to report a history of knee injuries (odds ratio [OR], 2.32; 95% CI, 1.22-4.44;  $P = .009$ ), overuse knee injuries (OR, 2.93; 95% CI, 1.16-7.36;  $P = .018$ ), and hip injuries (OR, 2.74; 95% CI, 1.09-6.86;  $P = .026$ ). Using the self-classification method, more participants self-classified as multisport ( $n = 213$ , 70.5%) than single sport ( $n = 89$ , 29.5%). Athletes from the small school were more likely to classify themselves as multisport ( $n = 128$ , 86%) ( $P < .001$ ) than those from the large school ( $n = 85$ , 56%). There were no differences in the history of hip, knee, or ankle injuries between athletes who self-classified as single sport (hip:  $n = 10$ , 3%; knee:  $n = 19$ , 6%; ankle:  $n = 35$ , 12%) versus those who self-classified as multisport (hip:  $n = 45$ , 8%; knee:  $n = 23$ , 15%; ankle:  $n = 98$ , 33%) ( $P > .370$ ) (Bell et al., 2016). They concluded that classification method and school size influenced the prevalence of specialization in high school athletes. Highly specialized athletes were more likely to report a history of overuse knee or hip injuries. Participating in a single sport for more than 8 months per year appeared to be an important factor in the increased injury risk observed in highly specialized athletes (Bell et al., 2016).

Patel and Jayanthi (2018) conducted a parent-child study of 36 families (50 youth and 42 parents) in order to gain a better understanding of the potential risks which go hand in hand with early sport specialization. Twenty seven families were asked to complete the PROMIS (Patient-Reported Outcomes Measurement Information System) questionnaire which allowed them to gather a better idea of their children's quality of life. Also present within this study was a cross-sectional survey as well as a semi-structured qualitative interview process. Important items such as training history, injury history, past medical history, and health-related quality of life were assessed within the cross-sectional survey. Meanwhile, important talking points were administered within the qualitative interviews with the majority of questions being designed for

both the parent and child, leaving only a handful of questions which were strictly for the child. The main goal of the interview process was to determine whether perceptions of sport specialization and parental experiences can influence the child's sports experiences and health-related quality of life. The interviews only occurred once and were conducted either in-person or via telephone and lasted no more than one hour. They were also recorded using a voice recorder so the data analysis process was simplified moving forward (Patel & Jayanthi, 2018).

Although the authors hypothesized that there would be a correlation in the quality of life between specializers and non-specializers, the results of the study did not support this. Instead, they were able to come to the conclusion that sports can have a protective effect on the life of all youth athletes regardless of specialization status. Perhaps the most impressive takeaway from these studies is the fact that the parents who were involved within the entire research process appeared to have a firm understanding of the consequences which our youth athletes can face by engaging in early sport specialization. This is an important step forward because it goes hand in hand with the current findings in almost all literature circles regarding the negative aspects of early sport specialization (Patel & Jayanthi, 2018).

## Chapter 4: Discussion

This chapter will answer all five of the original research questions based on the findings from the articles described in chapter 3. The initial purpose of this synthesis was to explore the factors involved in sport specialization for youth athletes.

### **Research Question #1: What are the current trends in sport specialization?**

Bell, Post, and Trigsted (2016) were looking to determine the prevalence of sport specialization in high school athletes and to determine if specialization is influenced by classification method, year in school, sex, and school size. A secondary purpose of theirs was to determine if highly specialized athletes would be more likely to report a history of lower extremity injuries.

They found that classification method and school size influenced the prevalence of specialization in high school athletes. For example, those who attended larger schools tended to specialize more often than those who attended smaller schools due to the number of opportunities to participate within sport at their selective schools. Highly specialized athletes were more likely to report a history of overuse knee or hip injuries along with burnout, fatigue, and mental exhaustion. Participating in a single sport for more than eight months per year appeared to be an important factor in the increased injury risk observed in highly specialized athletes (Bell et al., 2016). These findings compare favorably with the information which can be gathered throughout other pieces of literature regarding this topic.

Smith (2015) was also looking to dig deeper into trends in sport specialization. Within their findings, it was noted that history can help us predict issues with specialization and therefore, it seems likely that the trend of early specialization will continue. Even if evidence shows that specialization most often does not pay the benefits we hoped for, we know from the

concussion debate that parents, coaches, and athletes, and even some in the medical community, will ignore the research findings because they continue to perceive the benefits as outweighing the potential risks. Likewise, there will continue to be success stories of athletes whose early sport specialization resulted in gold medals, endorsements, and fame, just as we will have athletes whose multisport backgrounds are heralded as their secret to success. This is a practice that has been occurring for several decades; the difference now is in the prevalence of more youth participating in specialization in more sports (both individual and team) (Smith, 2015).

Russell (2014) discussed the growing trend of youth sports specialization as well as how former youth athletes' sport motivation, and current exercise and sport participation was related to whether or not they specialized in one youth sport. Youth sports has experienced a paradigm shift over the past 15 to 20 years and gone are the days filled with pick-up baseball games and free play. Children and youth are now increasingly specializing in organized sports, often times fueled by pressure from their parents.

The conclusion of the Russell (2014) study was that 57.2 percent of parents hoped for their children to play collegiately or professionally. They also found that one-third of respondents stated their children only played a single sport. Finally, it was culturally determined that parents have unrealistic expectations for their children to play either collegiately or professionally and as a result, many parents invested in private lessons, trainers, or personal coaches to help their kids. These findings compare favorably with the common belief that parents play the biggest role in pressuring their child to specialize since they believe this will be the best chance for their child to achieve success by receiving a scholarship or going professional. In reality, the common notion in the literature is that children are most likely to succeed by participating in multiple sports growing up and by developing a well-rounded

skillset. In summary, the following trends seem to be the most apparent in sport specialization for youth: Parents are playing a huge role in pressuring their child to specialize in organized youth sport because they believe this will allow them the best chance to receive a scholarship or play professionally. However, there are several studies which dismiss this idea and instead suggest that our youth should participate in multiple sports while growing up because this will allow them to develop a more well-rounded skillset (Russell, 2014). Also, there is clear evidence that classification method and school size have influenced the prevalence of specialization in youth athletes (Bell et al., 2016).

**Research Question #2: What are the physical/physiological factors to consider in sport specialization?**

Jayanthi, Holt, Jr., and LaBella (2018) examined injured athletes aged seven to eighteen years of age. Of 1190 athletes surveyed, 1139 (96%) possessed appropriate SES data which could be provided for the study. Compared with low-SES athletes, high-SES athletes reported more hours per week spent playing organized sports ( $11.2 \pm 6.0$  vs  $10.0 \pm 6.5$ ;  $P = 0.02$ ), trained more months per year in their main sport ( $9.7 \pm 3.1$  vs  $7.6 \pm 3.7$ ;  $P < 0.01$ ), were more often highly specialized (38.9% vs 16.6%;  $P < 0.01$ ), and had increased participation in individual sports (64.8% vs 40.0%;  $P < 0.01$ ). The proportion of athletes with a greater than 2:1 ratio (weekly hours in organized sport versus free play) increased with SES. Accounting for age and weekly organized sports hours, the odds of reporting a serious overuse injury increased with SES (odds ratio, 1.5;  $P < 0.01$ ) (Jayanthi et al., 2018).

High-SES athletes reported more serious overuse injuries than low-SES athletes, potentially due to higher rates of sports specialization, more hours per week playing organized sports, higher ratio of weekly hours in organized sports to free play, and greater participation in

individual sports. In conclusion, as SES increases, young athletes report higher degrees of sports specialization, greater participation in individual sports, and more serious overuse injuries (Jayanthi et al., 2018).

Pasulka, Jayanthi, McCann, Dugas, and LaBella (2017) examined current trends among young athletes towards earlier specialization age and how year-round training on multiple teams has raised concern for increased injury risk. In their clinical case-control study, injured athletes (aged 7–18 years) were recruited from sports medicine clinics and compared to similarly aged uninjured athletes recruited from primary care clinics. The conclusion within their study was that athletes in individual sports may be more likely to specialize in a single sport than team sport athletes. Single-sport specialized athletes in individual sports also reported higher training volumes and greater rates of overuse injuries than single-sport specialized athletes in team sports (Pasulka et al., 2017).

According to Hall, Foss, Hewett, and Myer (2015), their current study results indicate that sport specialization in female adolescents is associated with increased risk of anterior knee pain compared with multisport athletes. Further research is needed and should be focused to understand the possible underlying relationships between sport specialization and anterior knee-pain disorders including PFP, Osgood Schlatter, and Sinding Larsen- Johansson and risk of other lower- and upper-extremity injuries—in particular, the differences in neuromuscular control between sport-specialized athletes and multisport athletes (Hall et al., 2015). In summary, some physical/physiological factors to consider in youth sport specialization are overuse injuries, anterior knee-pain disorders, as well as lower- and upper-extremity injuries caused by overtraining (Jayanthi et al., 2018).

**Research Question #3: What are the psychological/emotional factors to consider in sport specialization?**

Russell and Symonds (2015) conducted a study which assessed 226 undergraduate students (M age = 19.55, SD = 1.27) by pencil and paper surveys. Questions on surveys related to current exercise and sport participation, youth sport motivations, and youth sport motivational climate perceptions. The conclusion of their studies found that self-reported specializers did not differ from non-specializers on exercise patterns as young adults, but were less likely to participate in sports as young adults compared to non-specializers. Specializers and non-specializers also did not differ on perceptions of motivational climate or youth sport motivations suggesting that neither of these factors accounted for observed lower sport participation as young adults of specializers (Russell & Symonds, 2015).

Smith (2015) examined the pros and cons of early sport specialization and made note of several psychological/emotional factors that come along with it. For example, burnout was a huge factor that was noted and has been a common problem among youth athletes who begin specializing at an early age. By practicing and engaging in the same sport year-round like many specializers do, they're inheriting mental health risks such as feeling burnt out from their sport which will have a negative effect on their abilities moving forward. Stress and anxiety are two other common effects which have been noted among those athletes who specialize at an early age, as they feel a pressure to succeed and perform at a high level due to so much of their time and efforts being spent on trying to be successful within their sport. Lastly, social isolation was another huge problem which was noted within this piece as almost all early specializers who have been surveyed or observed made note of the fact that they felt as though they were missing out on a lot of socialization opportunities because of their status. By participating in only one

sport athletes are limiting who they socialize with to only one group of people instead of building a wide range of relationships and social skills, which is definitely what experts within this field recommend. In summary, some psychological/emotional factors to consider in youth sport specialization include mental health issues such as stress/anxiety, burnout, social isolation from peers, and the stunting of key motor skills (Smith, 2015).

**Research Question #4: What are the socioeconomic factors impacting the choice to specialize?**

Jayanthi, Holt, Jr, and LaBella (2018) examined the effect socioeconomic status (SES) on rates of sport specialization and injury among youth athletes. Their hypothesis heading into these studies was that young athletes from a lower socioeconomic status would have lower rates of sport specialization and subsequently lower risk of overuse injuries. After going through the process of their study, their conclusions were that high-SES athletes reported more serious overuse injuries than low-SES athletes, potentially due to higher rates of sports specialization, more hours per week playing organized sports, a higher ratio of weekly hours in organized sports to free play, and greater participation in individual sports. The clinical relevance of the study is that as SES increases, young athletes report higher degrees of sport specialization, greater participation in individual sports, and more serious overuse injuries (Jayanthi et al., 2018).

Russell and Limle (2013) also discussed the socioeconomic factors impacting the choice to specialize with the goal of determining whether insurance type, financial class, median income or race are associated with risk of injury and serious overuse injuries in a diverse clinical population of young athletes. The conclusion of their studies was that there was an obvious trend for youth athletes with private health insurance and from higher median income areas to have more serious overuse injuries. This may be related to the observed trend for these same athletes

to have a higher degree of sports specialization, and participate in fewer weekly hours of free play (Russell & Limle, 2013). In summary, some socioeconomic factors to consider in youth sport specialization include an increased risk of overuse injuries for athletes from a higher SES due to an increased level of sport participation, as well as the sustained affordability for them to participate in multiple sports (Jayanthi et al., 2018).

#### **Research Question #5: Is early vs. late specialization more beneficial?**

Blagrove, Bruinvels, and Read (2017) studied some of the effects of early sport specialization and intensive training among female youth athletes in particular, along with some of the risks and recommendations of this topic. The conclusion of their studies was that adolescence is a crucial period of growth and maturation but also an important period to develop healthy lifestyle habits, which includes participation in a diverse range of sports and eating well. Intensive training routines, which are often the hallmark of early sport-specialization programs, can cause a number of significant health concerns for young female athletes, particularly those who participate in sports which demand low levels of body weight. Coaches supporting young female athletes have an important role to play in preventing and detecting the female athlete triad, and managing long-term athlete development (Blagrove et al., 2017). This information compares favorably with the other articles regarding the topic of early vs. late specialization as many researchers made note of how important of a role adolescence can play in the development of youth whether it be within their physical, social, or motor skill development.

Hall, Barber Foss, Hewett, and Myer (2015) also looked at the comparison between early and late specialization in sport, looking specifically at the association which early specialization has with an increased risk of developing anterior knee pain in adolescent female athletes. The current study results indicate that sport specialization in female adolescents is associated with an

increased risk of anterior knee pain compared with multisport athletes. Further research is needed and should be focused to understand the possible underlying relationships between sport specialization and anterior-knee pain disorders including PFP, Osgood Schlatter, and Sinding Larsen-Johannson and risk of other lower- and upper- extremity injuries – in particular, the differences in neuromuscular control between sport-specialized athletes and multisport athletes. Single-sport, sport-specialized athletes are at a greater risk (1.5-fold) of developing PFP. Sport-specialized athletes are four times more likely to develop Sinding Larsen Johannson/patellar tendinopathy or Osgood Schlatter disease than multisport athletes (Hall et al., 2015). This information compares favorably with the common belief of specializers being at a much greater risk for overuse injuries such as the ones listed above.

White and Oatman (2009) described the benefits of early vs late specialization throughout the surveys they administered to collegiate football and field hockey players. Their findings compared favorably with much of the literature regarding this topic as many knowledgeable people within the field are embracing the idea of encouraging youth athletes to participate in multiple sports while growing up. Although there are still people who believe the best way to achieve elite status within sport is by specializing, there is considerable valid research arguing to the contrary (White & Oatman, 2009). In summary, late specialization is supported within the literature as being more beneficial for youth athletes because it allows them the chance to participate in multiple sports while growing up which will assist with the process of developing effective physical, social, and motor skills prior to specializing in a single sport at a later age (Hall et al., 2015).

## **Chapter 5: Conclusions, Summary, and Future Recommendations**

The purpose of this synthesis was to help identify the factors involved in sport specialization for youth athletes. Given the research evidence included in this synthesis, it can be concluded that many youth athletes feel pressure from their parents to specialize, even if the evidence shows that specialization does not carry the benefits they expect (White & Oatman, 2009). We know from the concussion debate that parents, coaches, and athletes, and even some in the medical community, will ignore the research findings because they perceive the benefits as outweighing the risks. Likewise, there will continue to be success stories of athletes whose early sport specialization resulted in gold medals, endorsements, and fame, just as there will be athletes whose multisport backgrounds are heralded as their secret to success (Russell & Limle, 2013).

Russell (2014) discussed the growing trend of youth sports specialization as well as how former youth athletes' sport motivation, and current exercise and sport participation was related to whether or not they specialized in one youth sport. Youth sports has experienced a paradigm shift over the past 15 to 20 years, gone are the days filled with pick-up baseball games and free play. Children and youth are now increasingly specializing in organized youth sports, often times fueled by pressure from their parents. Culturally, parents sometimes have unrealistic expectations for their children to play either collegiately or professionally and as a result, parents invest in private lessons, trainers, or personal coaches to help their athletes. This is a very common problem with modern-day youth sports (Russell, 2014).

Based on the literature, it can also be concluded that specialists are at a much greater risk for overuse injuries, burnout, and mental exhaustion. In fact, several studies such as White

and Oatman (2009) support the belief that athletes are better off participating in multiple sports while growing up as it allows them to develop key physical and motor skills.

### **Future Directions for Studies in Youth Sport Specialization**

The findings of this synthesis have tremendous implications for individuals and specialists' seeking what factors are involved in sport specialization for youth athletes. The topic of sport specialization for youth athletes includes many avenues to pursue to continue to provide youth athletes, parents, coaches, and administrators with the information they need to feel informed regarding this topic.

Long-term, large scale studies are needed in which youth sport participants who specialize in a single sport are followed from youth into adolescence and young adulthood to more accurately track physical activity and sport behavior patterns (Russell & Limle, 2013). This would be a great way to monitor the changes occurring within the youth sport world. Future research is also necessary to determine what specific youth sport motivational climates determine whether early sport specialization has positive or negative outcomes. Studies should be conducted in a greater variety of sports and with a more balanced portion of male and female participants (Russell, 2014).

Further research is needed and should be focused to understand the possible underlying relationships between sport specialization and anterior knee pain disorders such as PFP, Osgood Schlatter, and Sinding-Larsen Johansson and the risk of other lower- and upper-extremity injuries – in particular, the differences in neuromuscular control between sport-specialized athletes and multisport athletes (Hall et al., 2015). By continuing research within this specific area, researchers will be able to more clearly define both the pros and cons of specialization within youth sport, both early and late.

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### Appendix A: Article Grid

Author	Title	Source	Purpose	Methods & Procedures	Analysis	Findings	Discussion/ Recommendations Research Notes –  Commonalities/Differences
William D. Russell  Ashley N. Limle	The Relationship Between Youth Sport Specialization and Involvement in Sport and Physical Activity in Young Adulthood	Journal of Sport Behavior  Russell, W. D., & Limle, N. A. (2013). The Relationship Between Youth Sport Specialization and Involvement in Sport and Physical Activity in Young Adulthood. <i>Journal of Sport Behavior</i> , 36(1), 82-99.	To determine if youth sport specialization and retrospective recall of youth sport experiences were related to participants' perceptions of and participation in sport and physical activity as young adults	A sample of 153 participants completed a Demographic Questionnaire, five-point Likert scale, and an 18-item Physical Activity Enjoyment Scale (PACES)	Two separate independent t-tests were conducted to determine current physical activity enjoyment and positive perceptions of youth sport experience, based on sport specialization status in youth	Young adults' sport participation patterns appear to be associated with their sport specialization status as youth athletes	Long-term, prospective studies are needed in which youth sport participants who specialize in a single sport are followed from youth into adolescence and young adulthood to more accurately track physical activity and sport behavior patterns of those who specialize in youth sport
Neeru A. Jayanthi  Daniel B. Holt, Jr  Cynthia R. LaBella	Socioeconomic Factors for Sport Specialization and Injury in Youth Athletes	Sports Health: A Multidisciplinary Approach. First published on May 31 <sup>st</sup> , 2018  Jayanthi, N. A., Holt, D. B., LaBella, C. R., & Dugas, L. R. (2018). Socioeconomic Factors for Sports Specialization and Injury in Youth	To measure the effect of socioeconomic status (SES) on rates of sport specialization and injury among youth athletes that has not been described previously	Participants completed surveys on training patterns, electronic medical records provided injury details as well as patient zip code, race, and health insurance. SES was estimated from zip code	Analysis of variance and multivariate regression were used for continuous variables, and multivariate logistic regression analyses were conducted to explore relationships between risk factors and injury	High-SES athletes reported more serious overuse injuries than low-SES athletes, potentially due to higher rates of sport specialization, more hours per week playing organized sports, higher ratio	As SES increases, young athletes report higher degrees of sports specialization, greater participation in individual sports, and more overuse serious injuries. Following these athletes as they grow up in order to continue further research is once again a great idea

		Athletes. <i>Sports Health: A Multidisciplinary Approach</i> , 10(4), 303-310.				of weekly hours in organized sports to free play, and greater participation in individual sports	
William D. Russell	The Relationship Between Youth Sport Specialization, Reasons for Participation, and Youth Sport Participation Motivations: A Retrospective Study	Journal of Sport Behavior  Russell, W. D. (2014). The Relationship Between Youth Sport Specialization, Reasons for Participation, and Youth Sport Participation Motivations: A Retrospective Study. <i>Journal of Sport Behavior</i> , 37(3), 286-306.	Examined how former youth athletes' sport motivation, and current exercise and sport participation was related to whether or not they specialized in one sport	200 participants completed a Demographic Questionnaire, five-point Likert scale, an 18-item Physical Activity Enjoyment Scale (PACES), and the Sport Motivation Scale (SMS)	Separate independent t-tests were conducted to compare specializers and non-specializers on their frequency of current sport participation, aerobic, and resistance training	Specializers did not differ from non-specializers on physical activity patterns or enjoyment as young adults, they were less likely to be active in sports as young adults	Future research is necessary to determine what specific youth sport motivational climates determine whether early sport specialization has negative outcomes
William D. Russell  Matt Symonds	A Retrospective Examination of Youth Athletes' Sport Motivation and Motivational Climate Across Specialization Status	Athletic Insight  Russell, W. D., & Symonds, M. (2015). A Retrospective Examination of Youth Athletes' Sport Motivation and Motivational Climate	To examine how the recall of former youth athletes' motivation and motivational climate differed by whether they specialized in one sport	226 undergraduate students were assessed by pencil and paper surveys. Questions on surveys related to current exercise and sport participation, youth	Separate independent t-tests were conducted to determine the similarities and differences between the specializers and non-specializers	Self-reported specializers did not differ from non-specializers on exercise patterns as young adults, but were less likely to participate in sports as young	Future research on current/modern-day youth athletes is warranted in order to continue validity within this subject

		Across Specialization Status. <i>Athletic Insight</i> , 7(1), 33-47.		sport motivations, and youth motivational climate perceptions	amongst the undergraduate student population which was assessed	adults compared to non-specializers	
Jacqueline D. Goodway  Leah E. Robinson	Developmental Trajectories in Early Sport Specialization: A Case for Early Sampling from a Physical Growth and Motor Development Perspective	Kinesiology Review  Goodway, J. D., & Robinson, L. E. (2015). Developmental Trajectories in Early Sport Specialization: A Case for Early Sampling from a Physical Growth and Motor Development Perspective. <i>Kinesiology Review</i> , 4(3), 267-278.	To further examine the argument for early sport specialization versus sport sampling from a physical growth and motor development perspective	Students and youth athletes of all ages were assessed based off of the pros and cons of being either a specializer or non-specializer within their youth sport situation	Analysis was conducted and determined based off of past instances which have been noticed between the development of specializers and non-specializers	A developmental trajectory approach from a physical growth and motor development perspective to youth sport means that we must maximize participation, minimize dropout, and provide children and youth with individual pathways tailored to a child's developmental needs and interests	Based on motor development and physical growth arguments for adopting early sport sampling, a developmental trajectory approach to youth sport using time frames and strategies was proposed
Randon Hall  Kim Barber Foss  Tim E Hewett  Gregory D. Myer	Sport Specialization's Association with an Increased Risk of Developing Anterior Knee Pain in Adolescent Female Athletes	Journal of Sports Rehabilitation  Hall, R., Foss, K. B., Hewett, T. E., & Myer, G. D. (2015). Sport Specialization's Association with an Increased	To determine if sport specialization increases the risk of anterior knee pain in adolescent female athletes	Female basketball, soccer, and volleyball players were recruited from a single county public school district in Kentucky. Each participant	Statistical analyses were conducted in SPSS and statistical significance was established. ANOVA was also used to evaluate potential group	Sport specialization in female adolescents is associated with increased risk of anterior knee pain compared with multisport athletes	Further research is needed and should be focused to understand the possible underlying relationships between sport specialization and anterior knee pain disorders such as PFP, Osgood Schlatter, and Sinding-Larsen Johansson and risk of other lower- and upper-extremity injuries – in

		Risk of Developing Anterior Knee Pain in Adolescent Female Athletes. <i>Journal of Sport Rehabilitation</i> , 24(1), 31-35.		was asked to report her current sport participation, any additional sports participation, and how many years she participated in sport	differences in height, mass, and age		particular, the differences in neuromuscular control between sport-specialized athletes and multisport athletes
Richard C. Blagrove Georgie Bruinvels Paul Read	Early Sport Specialization and Intensive Training in Adolescent Female Athletes: Risks and Recommendations	Strength and Conditioning Journal (Lippincott Williams & Wilkins)  Blagrove, R. C., Bruinvels, G., & Read, P. (2017). Early Sport Specialization and Intensive Training in Adolescent Female Athletes. <i>Strength and Conditioning Journal</i> , 39(5), 14-23.	To determine the risks and recommendations which should be made aware to female athletes as they engage in a certain specialization status and intensive training	Female youth athletes were administered paper and pencil surveys based on their previous experiences within sport as specializers or nonspecializers	Surveys were looked over and female youth athletes were compared and placed into groups based on specialization status	There are many risks which come along with early sport specialization within female youth athletes, as these are all more detrimental than helpful toward their athletic developments	Studies should be continued as we move forward in order to continue to observe the complex and always changing sporting world and the female youth athletes who compete within it. By doing this, results will be the most accurate and we'll be able to keep a running log of how things are going
Jacqueline Pasulka Neeru Jayanthi Ashley McCann Lara R Dugas Cynthia LaBella	Specialization Patterns Across Various Youth Sports and Relationship to Injury Risk	The Physician and Sports Medicine  Pasulka, J., Jayanthi, N., McCann, A., Dugas, L. R., & Labella, C. (2017). Specialization patterns across various youth sports and	To determine whether sport specialization and injury patterns vary by sports type	Injured athletes (7-18 years old) were recruited from sports medicine clinics and compared to similarity aged uninjured athletes recruited from	Participants completed a survey reporting age, gender, sports type, specialization patterns, and details regarding sports-related injuries in the	Athletes in individual sports may be more likely to specialize in a single sport than team sport athletes. Single-sport specialized athletes in individual sports also	Additional research is suggested in order to continue to identify the trends and possible solutions which can be used within some of these issues as the youth sports world continues to change and further develop moving forward

		relationship to injury risk. <i>The Physician and Sports medicine</i> , 45(3), 344-352.		primary care clinics	previous six months	reported higher training volumes and greater rates of overuse injuries than single-sport specialized athletes in team sports	
David R. Bell Eric G. Post Stephanie M. Trigsted	Prevalence of Sport Specialization in High School Athletics	The American Journal of Sports Medicine  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. <i>The American Journal of Sports Medicine</i> , 44(6), 1469-1474.	To determine the prevalence of sport specialization in high school athletes and to determine if specialization is influenced by classification method, year in school, sex, and school size. A secondary purpose was to determine if highly specialized athletes would be more likely to report a history of lower extremity injuries	High School athletes between the ages of 13 and 18 from two local high schools completed both a sport specialization survey and an injury history survey. Athletes were classified into low, moderate, or high specialization groups using a recently developed three-point system and were classified using a self-classification method	A cross-sectional study was conducted with the level of evidence being three	Classification method and school size influenced the prevalence of specialization in high school athletes. Highly specialized athletes were most likely to report a history of overuse knee or hip injuries. Participating in a single sport for more than eight months per year appeared to be an important factor in the increased injury risk observed in highly specialized athletes	Future continuous studies are needed in order to make note of any changes within youth sport and to recognize the prevalence of sport specialization within high school athletes
Nick N. DePhillipo	Patellofemoral Chondral Defect in a	International Journal of Sports	To describe a patellofemoral articular	Verbal informed consent	Radiographs were obtained	The consequences of	Studies should be continued as we move forward in order to

<p>Mark E. Cinque</p> <p>Nick Kennedy</p> <p>Jorge Chahla</p> <p>Gilbert Moatsche</p> <p>Robert F. LaPrade</p>	<p>Preadolescent Skier: A Case Report in Early Specialization</p>	<p>Physical Therapy</p> <p>DePhillipo, N. N., Cinque, M. E., Kennedy, N. I., Chahla, J., Moatsche, G., &amp; Laprade, R. F. (2018). Patellofemoral Chondral Defect in A Preadolescent Skier: A Case Report in Early Sport Specialization. <i>International Journal of Sports Physical Therapy</i>, 13(1), 131-136.</p>	<p>cartilage defect of the knee in a preadolescent skier due to overuse and repetitive microtrauma as a result of ESS</p>	<p>from both the subject and parents were obtained prior to publication. An eleven year old male competitive alpine skier presented with recurrent swelling of his right knee and persistent AKP while skiing without evidence of any overuse</p>	<p>which revealed an anatomic variant, a bipartite patella, but no other acute bone abnormalities. Magnetic resonance imaging (MRI) was also ordered</p>	<p>overuse and skeletal immaturity associated with ESS in young skiers can be detrimental to their health</p>	<p>continue to observe the complex and always changing sporting world and the female youth athletes who compete within it. By doing this, results will be the most accurate and we'll be able to keep a running log of how things are going</p>
<p>Maureen M. Smith</p>	<p>Early Sport Specialization: A Historical Perspective</p>	<p>Kinesiology Review</p> <p>Smith, M. M. (2015). Early Sport Specialization: A Historical Perspective. <i>Kinesiology Review</i>, 4(3), 220-229.</p>	<p>To provide an overview of the historical practices of early specialization within youth sports</p>	<p>High school and middle school athletes who engaged in early sport specialization filled out questionnaires</p>	<p>Surveys and questionnaires were measured and analyzed</p>	<p>Many athletes who specialized at a young age experience trouble with overuse injuries</p>	<p>Continuous research moving forward is necessary to validate the current findings and stay involved in the complex sporting world</p>

James White and Danny Oatman	Does Specializing in Team Sports During Childhood Translate into a Collegiate Career?	Missouri Journal of Health, Physical Education, Recreation, & Dance  White, J., & Oatman, D. (2009). Does Specializing in Team Sports During Childhood Translate into a College Athletic Career?. <i>Missouri Journal of Health, Physical Education, Recreation &amp; Dance, 19</i> , 20-5.	To provide an insight into whether specializing in team sports at an early age will increase the chances for an athlete to go on to have a more successful collegiate career within athletics	Collegiate football and field hockey players completed surveys which discussed several different topics such as how many sports they played growing up, at what age they began specializing, what their current sport participation status is, etc.	Surveys and interviews were videotaped, coded, and later analyzed as a group so that the process of comparing and contrasting each answer would be simplified	It was found that almost 83% of the sample played in three or more sports while growing up, and only around 3% actually specialized in a single sport before moving on to collegiate athletics	Moving forward, it would be beneficial to continue to conduct some very similar surveys and interviews with collegiate athletes from different sports than football and field hockey to see if they took a different path to where they currently are today
Patel, T., & Jayanthi, N.	Health-Related Quality of Life of Specialized Versus Multi-Sport Young Athletes: A Qualitative Evaluation	Journal of Clinical Sport Psychology  Patel, T., & Jayanthi, N. (2018). Health-Related Quality of Life of Specialized Versus Multi-Sport Young Athletes: A Qualitative Evaluation. <i>Journal of Clinical Sport Psychology, 12</i> (3), 448-466.	Conducted a parent-child study of 36 families (50 youth and 42 parents) in order to gain a better understanding of the potential risks which go hand in hand with early sport specialization	Both parents and children were treated as subjects within the study	Surveys and interviews were conducted with everybody involved. Most of the questions were strictly for the parents, however there were indeed a handful of questions which were asked of the children as well	They were able to come to the conclusion that sports can have a protective effect on the life of all youth athletes regardless of specialization status. Perhaps the most impressive takeaway from these studies is the fact that the parents who were involved within this entire research	We must continue to examine the quality of life which specializers and non-specializers are living in order to notice any difference which are noteworthy

						process appeared to have a firm understanding of the consequences which our youth athletes can face by engaging in early sport specialization	
Jayanthi, N. A., Holt, D. B., Labella, C. R., & Dugas, L. R.	Socioeconomic Factors for Sports Specialization and Injury in Youth Athletes	Sports Health: A Multidisciplinary Approach  Jayanthi, N. A., Holt, D. B., Labella, C. R., & Dugas, L. R. (2018). Socioeconomic Factors for Sports Specialization and Injury in Youth Athletes. <i>Sports Health: A Multidisciplinary Approach</i> , 10(4), 303-310.	The effect of socioeconomic status (SES) on rates of sports specialization and injury among youth athletes has not been described previously	Injured athletes aged 7 to 18 years were recruited from 2 hospital-based sports medicine clinics and compared with uninjured athletes presenting for sports physicals at primary care clinics between 2010 and 2013	Participants completed surveys on training patterns. Electronic medical records provided injury details as well as patient zip code, race, and health insurance type. SES was estimated from zip codes	As SES increases, young athletes report higher degrees of sports specialization, greater participation in individual sports, and more serious overuse injuries.	Further research could be useful moving forward in the upcoming years regarding SES as this isn't a topic that has seen a ton of exposure in the past and could certainly use some more
Wall, M., & Côté, J.	Developmental Activities That Lead to Dropout and Investment in Sport	Physical Education & Sport Pedagogy  Wall, M., & Côté, J. (2007). Developmental Activities That Lead to Dropout and Investment in Sport. <i>Physical</i>	To determine whether the nature and amount of childhood-organized sport, deliberate play and deliberate practice participation influence athletes' subsequent	The parents of eight current, high-level, male, minor ice hockey players formed an active group. The parents of four high-level, male, minor ice hockey	A complete data-set was available for ages 6 through 13, resulting in a longitudinal data-set spanning eight years. This eight-year range	Findings indicated that both the dropout and active players sampled a variety of different sports. Analysis revealed that players from	Moving forward, we must continue to conduct this same kind of analysis within other sports to see how they compare with one another whether it's the athletes, parents, or even coaches

		<i>Education &amp; Sport Pedagogy, 12(1), 77-87.</i>	decisions to drop out or invest in organized sport	players who had recently withdrawn from competitive hockey formed a dropout group	was divided into three levels of development corresponding to the players' progress through the youth ice hockey system	both groups increased the number of sports they participated in throughout the sampling years.	
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