

The Effects That Sport Specialization has on Youth Athletes

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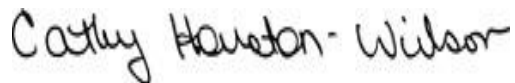


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Abstract

Youth sport specialization is becoming more popular than ever. Many athletes, parents and coaches think that sport specialization is the best way to reach elite level status in a sport. However, athletes, parents and coaches don't know all of the positive and negative effects of specialization in a sport. Whereas, sport specialization may help you gain skill development, it is also correlated with higher chances of overuse injuries, psychological stress, and burnout. The purpose of this study is to review the literature and investigate the effects of sport specialization on youth athletes. It was determined that specializing in a sport can allow an athlete to attain a higher level of performance. It was also determined that overuse injuries are the biggest disadvantage when specializing in a sport. Finally, it was determined that younger athletes are at more psychological and physical risk than older athletes.

Keywords - sport specialization, youth athletes, multi-sport athletes, overuse injuries, burnout, skill development

Chapter 1: Introduction

Playing sports is a great way to start a healthy lifestyle and work on motor skill development. In 2022, 77% of children aged 5 to 19 years participated in at least one organized sport (Huard et al., 2022). Over the past decade, it has been reported the number of youth athletes specializing in only one sport has been increasing, and the number of multisport players decreases significantly after junior high school (age 12-15 years) (Nagano & Oyama, 2023).

The level of competitiveness in youth sports is trending upwards causing more competitive games and events at younger ages, specific training, and sport specification. Many believe youth sport specialization benefits sport skill development (Strosser, 2022). Positive effects of sport specialization could be higher level of competition, more time spent practicing that sport, enhanced skill development through practice, and level of achievement (McLellan et al., 2022). “Incentives for early sports specialization include the labels of child prodigy or gifted, the pursuit of college scholarships and sponsorships, and the hope of attaining Olympic, elite, or professional status” (McLellan et al., 2022, p. 107).

However, research suggests specialization may not really be needed to be elite in the sport (Strosser, 2022). Furthermore, sport specialization may have negative effects. Sport specialization “is associated with high-volume training that can result in psychological stress and overuse injuries” (Post et al., 2021, p. 190).

Youth athletes that specialize in sport have higher stress levels than athletes who play multiple sports (Garinger et al., 2018). Examples of psychological stress can be isolation, poor academics, anxiety, greater stress, inadequate sleep and decreased family time (Brenner et al., 2019). Burnout is a reported psychological effect that athletes might face when specializing in one sport. Once a child spends 4-6 hours daily in practice, there is little time for other

recreational activities. The stress that comes with sport specialization can lead to burnout and dropout in these athletes, compared with their peers (Callender, 2010). Causes of burnout can include parental pressure, excessive demands, a lack of fun, win-at-all-costs environments, a lack of growth in personal development, injuries, and decreased recovery time (Donnelly, 2018).

In addition to negative psychological effects, negative physical effects are possible. Overuse injuries can happen to any athlete in a sport; however, “the high-volume training, repetitive tissue stresses, and limited rest associated with sports specialization could play a role in the high rates of noncontact and overuse upper extremity injuries” (Crocì et al., 2021, p. 231). It has been recommended that a 13-year old child should not participate in more than 13 hours of organized sport and should have at least 4 months off from sport (Hernandez et al., 2021). Children at a young age who are exposed to high volume training with high repetitions have an even greater risk of injuring themselves (Crocì et al., 2021). It has also been reported that athletes playing multiple sports have fewer overuse injuries (Nagano & Oyama, 2023).

Athletes

Sport specialization directly affects the athlete. Therefore, the athletes themselves should know the benefit to risk ratio that comes with specializing in a sport. Examples of problems that can occur at a young age are higher rates of injury, increased psychological stress, and quitting sports at a young age (Neeru et al., 2013). It has been reported that sport specialization increases as an athlete progresses through high school (Rugg et al., 2021). By specializing later in adolescence, athletes may still gain significant skill and motor development, but may reduce the risk of overuse injuries, burnout, and psychological stress.

Parents

Since youth athletes are inexperienced, parents and coaches tend to be primary influences

on their decisions. However, athletes, parents, and coaches have different views and opinions on this topic. Parents have been reported to believe that early sport specialization is beneficial for their child, but parents overestimate their child's ability to receive a college scholarship (Cardner et al., 2020). Parents encourage participation in sports on their children without the proper education of training volumes or understanding the risks of sport specialization (Cardner et al., 2020). If parents are making these decisions for their athletes, they need to be well educated on the topic so they do more good than harm to their child. Pressure from parents and coaches, as well as the hunger to become an elite athlete, have motivated many youths to specialize in a single sport (Cardner et al., 2020).

Coaches

Like parents, coaches are also a primary influence on a youth athlete. Coaches vary on opinions whether athletes should specialize in a sport or should play multiple sports. Most coaches make recommendations based on their experiences (Post et al., 2021). Coaches are often not fully aware of the sport volume recommendations to prevent injury with regard to the number of hours per week in a single sport, the number of months per year in a single sport, or the number of simultaneous leagues in which an athlete participates (Post et al., 2021). Less than half of the coaches were “very” or “extremely” concerned about the psychological harm or risk of injury that the athletes might encounter when specializing in youth sports (Post et al., 2021).

Statement of Problem

Playing sports is a great way to start a healthy lifestyle and work on motor skill development. And in an effort to be better, the number of youth athletes specializing in one sport has been increasing (Nagano & Oyama, 2023). The benefits are mastering the skills faster, more repetitions, extended drill time, increased competition, more feedback and more time to correct

feedback (McLellan et al., 2022). However, it also has been reported that sport specialization may not be necessary in order to be an elite athlete (Strosser, 2022). And as there may be positive effects, negative effects can impact a youth athlete if they decide to specialize in a sport. The risks that come with specialization are mental and physical burnout, boredom, injury, overtraining, and social development issues (Donnelly, 2018). To guide their decisions, parents and athletes are often involved, but lack information needed to make sound decisions.

Purpose of the Study

The purpose of this study is to review the literature and investigate the effects of sport specialization on youth athletes.

Operational Definition

- Sport Specialization is defined as playing a single sport for 8 or more months per year at the exclusion of other sports.
- Youth Athletes are athletes aged 7-19.
- Multi-Sport Athletes are athletes that play more than one sport.
- Overuse Injuries are defined as sports-related microtraumas that result from repetitively using the same parts of the body, usually by overtraining.
- Burnout is a condition in which an athlete experiences fatigue and declining performance in his/her sport despite continuing or increased training.
- Skill Development is defined as acquiring the ability or capacity through sustained and systematic efforts.

Research Questions

1. What is the most frequent positive effect that sports specialization has on the athlete?
2. What is the most frequent negative effect from sports specialization on the athlete?

3. Is there an interaction between sport specialization and age?

Delimitations

1. The study on focused on youth athletes aged 7-19.
2. The study only included articles from 2004-2023.
3. The study uses only peer reviewed articles.
4. The study uses only academic journals.

Chapter 2: Methods

The purpose of this study is to review the literature on the effects of specializing in one sport. The purpose of this chapter is to describe how articles were selected to be used in this study. The articles were selected based on how they were related to sport specialization, youth athletes, skill development, injury and burnout. The studies collected for this synthesis were located using the EBSCO database from The SUNY Brockport Drake Library. The criteria that was used for the articles was they had to be published from 2000-2022, data-based peer reviewed articles, and they were full text articles. Within the EBSCO database, all articles came from SPORTDiscus.

The original search terms were “sport specialization” and “youth athletes,” which yielded 217 results. After including “effects” and “full text peer reviewed articles,” the number was reduced to 44. After reviewing the articles, 5 were selected to be a part of this study as they related to the effects of sport specialization.

The key words used in the next articles search began with “sport specialization” and “youth athletes,” which again yielded 217 results. To reduce this number, “skill development” was included. The search was limited to “peer reviewed” and “full text” articles, and the number of articles was reduced to 32. After reviewing these articles, 3 were used in this synthesis related to skill development.

Again, the key words used in the search for the next articles started with “sport specialization” and “youth athletes.” and yielded 217 results. To reduce this number, the keywords “injury risk” and “burnout” were included. Then the search was limited to “full text” and “peer reviewed” articles.” This reduced the number of articles to 20. After reviewing the articles, 2 were selected that related to injuries and burnout.

The key words used in the selection of the next articles started off began with “sport

specialization” and “youth athletes,” and yielded 217 results. To get more information on positive effects, the keyword “positive” was included. Then the search was limited to “full text” and “peer reviewed” articles,” which reduced the number of articles to 14. After reviewing the articles, 1 was selected for the study related to negative effects.

The selected articles came from a wide range of journals. The journals include, *Sports*, *Sports Health: A Multidisciplinary Approach*, *Journal of Clinical Sport Psychology*, *Journal of Sport Behavior*, *Sports Health*, *Journal of Sport Rehabilitation*, *National Institute of Health Journal of Sport Rehabilitation*, *Open Access Journal of Sports Medicine*, and *Journal of Athletic Training*.

The literature review included in this critical mass were chosen based on sport specialization in youth athletes aged 7-19. Participants in the studies ranged from different sports and different ages between 7-19 years old. Participants that were used in this study were athletes who specialize in a sport and also athletes who played multiple sports. Some researchers have investigated multi-sport athletes so that they could compare and contrast the two.

Chapter 3: Review of Literature

The purpose of this chapter is to review the literature on how sport specialization can affect youth athletes. After examining these articles, three major themes were identified. The three themes were positive effects of sport specialization, negative effects of sports specialization and beliefs/perceptions of sport specialization that are caused from sport specialization.

Positive Effects of Sport Specialization

There wasn't much existing literature for positive effects on sport specialization, but Hecimovich (2004) examined the effects of early skill acquisition, and the sociological, psychological, and physical aspects of sport specialization. The researcher stated that "a certain degree of specialization is necessary for optimal individual and team performance in sports." The author suggests that specialization is definitely necessary, but only when the athlete is ready to specialize. "When the general conditioning for the sport is almost completed, and when the young athlete's character, talent, and inclination suggests that his/her chances for success are good," then the athlete is ready to specialize (Hecimovich, 2004, p.34). The author also noted that a positive effects of specializing can be enhanced motor skill acquisition, which could lead athletes to a greater chance to receive an athletic scholarship.

Additionally, DiCesare et al. (2021) did a study that compares multisport athletes and athletes that specialize in one sport. The biggest controversy about sport specialization is determining if playing multiple sports is better for quality of life and skill development. The authors examined the motor behavior and coordination differences between multi-sport athletes and athletes that specialize in a sport. Participants included 1,116 female basketball, soccer and volleyball players. The study used 3-dimensional motion analysis assessment, which assessed the athletes' drop vertical jump (DVJ). The authors reported that the sport specialization group

increased "limb hip flexion and knee flexion, knee flexion and knee abduction, and knee flexion and knee internal rotation while landing during the DVJ" (DiCesare et al., 2021, p.1105). This evidence shows that sport specialization can be good for overall athleticism, but may depend on the sport.

Negative Effects of Sport Specialization

"The prevalence of youth athletes specializing in one sport has been increasing over the past decade. Subsequently, the rate of youth athlete injury has also been increasing" (Cardner et al., 2020). There are many negative effects that come with sport specialization. Overuse injuries and burnout are the two main negative effects when it comes to sport specialization.

Cardner et al., (2020) investigated if sport sampling is associated with a lower sports injury rate in youths compared with youths who specialize in one sport. The total participants were 5,736; and of those, 2,451 were sport samplers (multisport); and 1,628 were sport specialists. Criteria included in the meta-analysis included studies with athletes between 7 and 18 years old that reported injury rates, and it examined if athletes were sport samplers or specialized. The authors reported that sport specialists had a significantly higher injury risk than the sport samplers.

In addition, Croci et al., (2021) also compared the injury history of the throwing arm, shoulder and elbow in college baseball players who reported specialization by the age of 13. The 3-criteria sport questionnaire data was collected from 129 college baseball players. The instrument consisted of 3 questions: At what age did you train for more than 8 months out of the year in baseball? At what age did you consider baseball more important than other sports? And at what age did you quit other sports to focus on baseball? The participant responses were then separated into 3 different groups, which were low, medium and high specialization. They found

that high specialization by age 13 years was associated with worse arm function and greater odds of upper extremity injury than moderate and low specialization.

Similarly, Post et al. (2020) investigated overuse injuries on athletes between ages 12-18 to determine if the overuse injuries were sport specific. The purpose of this study was to examine sport-specific the relationships of gender, sport specialization, and sport volume with overuse injuries in athletes who participate in basketball, soccer, and volleyball. There were 716 participants in this study, and they were recruited at club tournaments, competitions, and events in the state of Wisconsin. The researchers wanted to investigate the different genders, because “female youth athletes are more likely to specialize, participate in a single sport at high volumes, and sustain overuse injuries compared with male youth athletes” (Post et al., 2020). Participants completed a survey about demographics, specialization status, monthly and weekly sport volume, and sport injury history. The authors reported that the effect of gender, sport specialization, and high-volume participation on overuse injury may be sport specific. High levels of specialization were associated with overuse injury history in volleyball athletes, but not in basketball or soccer athletes. As a result, overuse injuries can vary from sport to sport, and some sports in which athletes specialize can cause more overuse injuries than others. The authors recommended that if athletes want to specialize, they should be sure to know the effects that can come with that specific sport.

In addition, the quality of life is very important for every individual, whether you are an athlete or not. Quality of life (QOL) is essential, especially for athletes, to help grow your motor skills and to perform at the highest level possible. Watson et al. (2022) investigated QOL, and noted that while athletes have higher health-related QOL than non-athletes, there are a number of risk factors that can threaten QOL among athletes in particular. The authors evaluated sport

specialization, sleep, and quality of health in 1,482 female youth athletes. The athletes completed a survey to determine if they are specializing at a low, moderate or high rate. The authors also evaluated injury history, quality of life, sleep duration, and daytime sleepiness. Chi-square tests were used to compare the rates of specialization and injury history between the different specialization groups. The study reported that specialized female volleyball athletes demonstrate decreased QOL, because of higher rates of prior injury. Furthermore, specialization is also associated with increased daytime sleepiness (Watson et al., 2022).

Similarly, Nagano et al. (2023) investigated overuse injuries in different types of sports settings. Playing different sports or different types of sports can play divergent roles on your body, depending on what your body needs to do in order to play in that sport. As stated by previously, early specialization and its effects are different in each sport type. For example, overuse injuries could happen more often in baseball because you use a lot of the same body parts, like your arm, compared to football. In addition, different sports and sport types play a role in overuse injuries. The authors compared overuse injuries among 1,377 athletes who specialized in single sport, and separated athletes into individual or team sports. Participants completed a questionnaire on sports participation from elementary school to high school. It was reported that specialized athletes had a higher chance to have overuse injuries compared to non-specialized athletes.

Beliefs/Perceptions

There are many different perceptions and beliefs when it comes to sport specialization. People have their own opinions based on their own experiences or what they've heard from others. Hernandez et al. (2021) investigated perceptions on specialization in a sport with 1,998 parents and athletes. The purpose was to compare the beliefs of youth athletes and parents on the

components related to sport specializing. In this study, the authors used a descriptive survey which included a Chi-square test and a 7-point Likert scale to separate answers into different categories. The categories were separated into 1-2 (few), 3-5 (some) and 6-7 (most) to determine the attitude and beliefs of youth athletes and parents. There were significant differences in the responses between parents and children when answering questions related to their sport. The parents were very concerned about the risk of injury, and they recognized that there is not a great chance to get a scholarship because a very small percentage of people actually obtain a scholarship. On the other hand, youth athletes were not concerned about the risk of injury. There needs to be better communication on the effects of sport specializing.

Similarly, Strosser (2022) investigated parents' beliefs about youth sport specialization and their athletes' specialization status. The study surveyed 535 parents on their beliefs of youth sport specialization. Chi-square was used for analysis, and the authors reported that most of the parents didn't seem to find a serious problem with specializing in a sport. The authors did not report that youth sport specialization had any effect on overuse injuries or burnout.

Coincidentally, Pelletier and Lemoyne (2022) did a study on the influence of relative age effect (RAE) for early sport specialization. The purpose was to investigate whether relative age effect influences young athletes' awareness of competence in sports development. Participants in this study were 89 male and 115 female non-elite hockey players. Chi-square tests were completed and Cramer's V (association between two nominal variables) was used to assess whether RAE influences young athletes' awareness of competence in sports development. The authors reported that sport specialization does not affect the self-perception of ice hockey players.

For the last piece of literature, Patel et al. (2018) examined the health related quality of

life of athletes and parents while playing multiple sports or specializing in a sport. Fifty youth athletes and 42 parent participants completed a survey assessing the athletes past training history and injury history. The findings indicated that a positive quality of life was just a part of sports. The researchers found no evidence that sport specialization or playing multiple sports had any impact on quality of life.

Throughout this chapter, positive effects, negative effects and beliefs/perceptions were examined. There were many different opinions and evidence that showed parents and athletes have different viewpoints on sport specialization. It was also determined that there are many positive and negative effects that come with sport specializing. It is the responsibility of the sport participants to determine what is best for them personally, and how their sport could affect them if they specialize.

Chapter 4 — Results, Discussion and Recommendations for Future Research

The purpose of this study is to review the literature and investigate the effects of youth athletes specializing in one sport. The purpose of this chapter is to present the results of the review of literature on youth athletes sport specialization and how these results align with the research questions which guided this synthesis project. Three research questions were answered. First, what is the most frequent effect of sport specialization? Second, what are the most frequent negative effects of sport specialization? Third, is there an interaction between sport specialization and age?

Interpretation

The first research question investigated the most frequent positive effect that sports specialization has on athletes. The most frequent positive effects that sport specialization has on the athlete is skill development, with the benefit being motor skill acquisition (Hecimovich, 2004). The more an athlete focuses and practices in a specialized sport, the more the athlete will become competent in the skills that are required to play that sport at a high level. Additionally, with the short career of most athletes and finite amount of time with which an individual can reach peak performance, many athletes and coaches believe it is a mistake not to specialize early (Hecimovich, 2004). Individuals at an earlier starting age attain a higher level of performance than those who train but commit later in adolescence (Hecimovich, 2004; DiCesare et al. 2021; Croci et al., 2021).

The second research question investigated the most frequent negative effect that sports specialization has on the athlete. The prevalence of youth athletes specializing in one sport has been increasing over the past decade; subsequently, youth athlete injuries have also been increasing (Cardner et al., 2020). Overuse injuries are the primary negative effect that comes

with specializing in a sport. For example, “highly specialized female volleyball athletes demonstrate decreased quality of life due to higher rates of prior injury” (Watson et al., 2022). Children who continued to play only one sport from elementary school age to high school age had a higher chance to experience overuse injuries by the time the athletes enter high school (Nagano et al., 2023; Watson et al., 2022). Athletes tend to keep using the same body parts and muscles over and over again, which results in overuse injuries, and athletes who have higher degrees of specialization have a higher risk for serious overuse injuries during childhood (Patel et al., 2018). Although psychological stress and burnout are also concerning issues for athletes, parents, and coaches, overuse injuries are the biggest disadvantage when specializing in a sport (Cardner et al., 2020; Nagano et al., 2023; Patel et al., 2018; Watson et al., 2022). Ironically, research suggests specialization may not really be needed to be elite in the sport (Rugg et al., 2021; Strosser, 2022).

The third research question investigated the interaction between sport specialization and age. The American Academy of Pediatrics clinical report on single-sport specialization recently recommended that youth hold off on specialization until after puberty. Younger athletes can experience more problems than older athletes if they specialize too early, such as higher rates of injury, increased psychological stress, and higher rates of quitting (Neeru et al., 2013). Sport specialization of athletes at 15 years of age have shown that it is still possible to accomplish elite level status by specializing later in adolescence compared to specializing as early as possible (Rugg et al., 2021; Strosser, 2022). The results from the review of literature indicate that there are interactions between sport specialization and age, where younger athletes are at more psychological and physical risk (Neeru et al., 2013; Rugg et al., 2021).

Implications

Multiple implications exist that athletes, parents, and coaches can utilize. Athletes, parents, and coaches should be aware of both positive and negative effects that come with sport specialization. The athletes should be aware that overuse injuries are common, and must keep track of their own body. Parents should look for signs of stress, and be aware of the psychological issues, including burnout. And coaches should be aware of physical and psychological stress, and should plan accordingly. Coaches are often not fully aware of the sport volume recommendations to prevent injury with regard to the number of hours per week in a single sport, the number of months per year in a single sport, or the number of simultaneous leagues in which an athlete participates (Post et al., 2021). Coaches and parents should understand the specific roles they play in the specialization process, and most importantly when youth athlete specialization is appropriate.

Future Research

Future research is needed to investigate sport specific benefits and disadvantages. When reviewing the literature, there was minimal information about specializing in specific sports, which may have unique considerations. Individual sports differ in terms of movement patterns and body parts emphasized. For example, in baseball upper extremities are used more often; whereas in soccer, the lower extremities are used more often. Individual sports also differ in the length of the competitive season, which could lead to different sport specific injuries. There is likely beneficial information that can be derived for different sports that can inform athletes, parents, and coaches.

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Appendix – Article Summary Chart

Author	Title	Source	Purpose	Methods & Procedures	Analysis	Findings
Carder, S. L., Giusti, N. E., Vopat, L. M., Tarakemeh, A., Baker, J., Vopat, B. G., & Mulcahey, M. K.	Preventing youth athlete injury: A systematic review and meta-analysis	The American journal of sports medicine	To determine if sport sampling is associated with a lower sports injury rate in youths compared with youths who specialize in 1 sport	Criteria included reported injury rates and studies that specify if athletes were sport samplers or specialized in a sport. 5,736 participants. Of those, 2,451 were sport samplers, 1,628 were sport specialists	Youth athletes who specialize are 37% more prone to suffer an injury than those multi sport athletes	Sport specialists had a significantly higher injury risk than the sport samplers.
Croci, J., Nicknair, J., & Goetschius, J.	Early sport specialization linked to throwing arm function and upper extremity injury history in college baseball players	Sports Health	The purpose of the study was to compare the function of the throwing arm, shoulder and elbow injury history in college baseball players who reported specialization by the age of 13 years	The 3 criteria sport questionnaire data was collected from 129 college baseball players. They were separated into 3 different groups. Low, medium and high specialization.	Participant age, weight, height, years of baseball played, and baseball position between the high, moderate, and low specialization groups using 1-way analyses and a chi-square test was compared.	High specialization by age 13 years was associated with worse arm function and greater odds of upper extremity injury than moderate and low specialization; This seemed to be greatest when comparing high specialization with moderate specialization.

Garinger, L. M., Chow, G. M., & Luzzi, M	The effect of perceived stress and specialization on the relationship between perfectionism and burnout in collegiate athletes	Anxiety, Stress & Coping	Examine relationship among perfectionism, stress, and burnout in specialized and multiple sport collegiate athletes	Demographic questionnaire and online measures of perfectionism, stress, and burnout		
Hecimovich, M	Sport Specialization in youth. A literature review	Journal of Chiropractic	Purpose is to take a look at the advantages and disadvantages of sport specialization	The studies were taken from multiple sources that examined sport specialization. The studies looked at sociological, psychological, physiological	Meta analysis, vote counting and qualitative criteria	There are many advantages and disadvantages that come from specializing in a sport
Hernandez, M., Biese, K., Schaefer, D., Post, E., Bell, D., & Brooks, A.	Different perceptions of parents and children on factors influencing sport specialization	Journal of sport rehabilitation	The purpose of this study was to compare the beliefs of youth athletes and parents on the factors related to sport specialization	Descriptive survey of youth athletes and their parents. There were 993 children and 1005 parents in this study. The questionnaires were completed by the athletes and parents at the site of their tournaments	There was a 7 point likert scale used to separate answers into 3 categories. 1-2 (a few), 3-5 (some) and 6-7 (most) to determine the attitude and beliefs	Parents and children have different attitudes and beliefs related to sport specialization
Huard Pelletier, V., & Lemoyne, J.	Early sport specialization and relative age effect: Prevalence and influence	Sports	Purpose is to investigate whether RAE influence	1 primary sample was used to measure the perceived competence of	Chi-square cross tabulations were completed, and Cramer's	The results of this study highlight the presence of RAE and ESS in Canadian

	on perceived competence in ice hockey players		young people's perceived competence in long-term sports development	ESS, and RAE of the 89 male and 115 female players, and 2 secondary samples were used to compare these with non-elite ice hockey players	V was calculated to assess effect size. Percentage deviation was measured to show the degree to which an observed chi-square cell frequency differs from the value expected	minor ice hockey. It indicates that they do not affect the self-perception of ice hockey players
Patel, T., & Jayanthi, N.	Health-related quality of life of specialized versus multi-sport young athletes: A qualitative evaluation	Human Kinetics	The purpose was to investigate health-related quality of life of single sport and multi-sport young athletes and their parents	50 youth athletes and 42 parent participants were asked to complete a survey, using a tool called REDcap, which assess their training history, injury history, past medical history, and health-related quality of life	Analysis of interviews highlighted positive perception of sports and parents' concern regarding sports specialization .	No quality of life differences were found based on sport specialization. Highly positive quality of life scores suggest a benefit of sports despite specialization
Post EG;Biese KM;Schaefer DA;Watson AM;McGuire TA;Brooks MA;Bell DR	Sport-specific associations of specialization and sex with overuse injury in youth athletes	Sports Health	Examine sport-specific associations of sex, sport specialization, and exceeding sport volume	716 participants were recruited around the state of Wisconsin. Participants were asked to complete survey about demographics,	Data were summarized into means and standard deviations, frequencies and proportions. They were used to determine	The influence of sex, sport specialization, and excessive sport volume on overuse injury may be sport specific. High levels of

			with overuse injuries in athletes (ages: 12 and 18) basketball, soccer, and volleyball athletes	sport specialization status, monthly and weekly sport volume, and sport-related injury history	differences in sex, age, sport specialization, and sport volume recommendation	specialization were only associated with overuse injury history in volleyball athletes and not in basketball or soccer athletes.
Rugg, C. M., Coughlan, M. J., Li, J. N., Hame, S. L., & Feeley, B. T.	Early Sport Specialization Among Former National Collegiate Athletic Association Athletes	American Journal of Sports Medicine	Determine trends in sport specialization by sex, sport, and decade of participation	Electronic survey was distributed to NCAA athletes who participated from 1960 to 2018	Logistic regression analysis to determine predictors	One-fifth of NCAA athletes specialized before age 15 and neither scholarship attainment or time-loss injury was affected by early specialization
Strosser, S.	The association between parents' beliefs about youth sport specialization and their children's specialization status	Journal of Sport Behavior	Determine parents' beliefs about youth sport specialization and the association between these beliefs and their children's specialization status	535 youth sport parents were surveyed on their beliefs about youth sport specialization.	Chi-square analyses were used to figure out the association between parents' beliefs about youth sport specialization and their children's specialization status	Descriptive statistics indicated most participants do not view youth sport specialization as a serious problem. They do not believe youth sport specialization increases children's chance of injury, and are not concerned with the injury risks

<p>Watson , A., McGuine, T., Lang, P., Post, E., Kliethermes, S., Brooks, A., & Bell, D.</p>	<p>The relationships between sport specialization , sleep, and quality of life in female youth volleyball athletes</p>	<p>Sports Health</p>	<p>Evaluate the relationship between sport specializati on, sleep, and quality of health in female youth athletes</p>	<p>1,482 players completed preseason surveys to determine sport specialization (low, moderate, high), injury history, QOL, sleep duration, and daytime sleepiness.</p>	<p>Chi-square tests were performed to compare the rates of specialization across the different grades and the rate of prior injury between specialization groups.</p>	<p>Highly specialized female volleyball athletes demonstrate decreased QOL, perhaps because of higher rates of prior injury. Specialization is also associated with increased daytime sleepiness.</p>
<p>Nagano, Y., & Oyama, T.</p>	<p>Early Sport Specialization Trends and Injuries in Former High School Athletes Specialized in Sports</p>	<p>Europe PMC</p>	<p>Investigate participants who had been participatin g in a single sport, in individual or team sports from an early age and to compare overuse injuries among these participants .</p>	<p>1,377 participants completed a questionnaire on sports participation from elementary school to high school and injury history at high school age. Specialized / non specialized groups were compared, and differences in overuse injury were examined.</p>	<p>Specialized/n on specialized groups were calculated and compared using the chi-square test. Differences in overuse injury in the specialized/n on specialized groups were assessed using the chi-square test.</p>	<p>The group that specialized in team sports was also associated with a higher prevalence of overuse injuries.</p>