

# Factors That Drive Youth Specialization

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**Background:** Specialization in young athletes has been linked to overuse injuries, burnout, and decreased satisfaction. Despite continued opposition from the medical community, epidemiological studies suggest the frequency is increasing.

**Hypothesis:** Extrinsic pressures in addition to individual aspirations drive this national trend in sports specialization.

**Study Design:** Descriptive epidemiology study.

**Level of Evidence:** Level 3.

**Methods:** A novel instrument assessing the driving factors behind youth specialization was generated by an interdisciplinary team of medical professionals. Surveys were administered to patients and athletes in the department's sports medicine clinic.

**Results:** The survey was completed by 235 athletes between 7 and 18 years of age, with a mean age of  $13.8 \pm 3.0$  years. Athletes specialized at a mean age of 8.1 years, and 31% of athletes played a single sport while 58% played multiple sports but had a preferred sport. More than 70% of athletes had collegiate or professional ambitions, and 60% played their primary sport for 9 or more months per year, with players who had an injury history more likely to play year-round ( $P < 0.01$ ). Approximately one-third of players reported being told by a coach not to participate in other sports, with specialized athletes reporting this significantly more often ( $P = 0.04$ ). Half of the athletes reported that sports interfered with their academic performance, with older players stating this more frequently ( $P < 0.01$ ).

**Conclusion:** Young athletes are increasingly specializing in a single sport before starting high school. While intrinsic drive may identify healthy aspirations, extrinsic influences are prevalent in specialized athletes.

**Clinical Relevance:** Extrinsic factors contributing to youth specialization were identified and compounded the deleterious sequelae of youth athlete specialization.

**Keywords:** pediatric sports medicine; youth specialization; overuse injuries

Participation in organized youth sports continues to grow, as more than 30 million adolescents and children play sports in the United States alone.<sup>1</sup> Accompanying this surge in youth sports participation, however, is a concomitant rise in sports-related injuries. An incidence of more than 2.6 million annual sports injuries has been reported in patients aged 24 years or younger,<sup>7</sup> with at least half of sports injuries presenting to the emergency room being overuse in nature.<sup>23</sup>

One aspect contributing to this epidemic of overuse injuries in youth athletes is early sports specialization. National physician organizations such as the American Academy of Pediatrics (AAP) and the American Orthopaedic Society for Sports

Medicine (AOSSM) have firmly advised against specializing in a single sport during early adolescence.<sup>13,22</sup> AOSSM has defined *early sports specialization* as the combination of playing and training in a single sport for greater than 8 months per year, playing a single sport "to the exclusion of participation in other sports," and starting this commitment prior to age 12 years.<sup>13</sup>

Multiple investigations have demonstrated the detrimental sequelae of early specialization, including burnout, overuse injury, and decreased enjoyment.<sup>6,9,17</sup> Despite this evidence, young athletes are specializing earlier and more definitively. The largest youth specialization study conducted to date analyzed a cohort of more than 1000 patients between 7 and 18 years of age, demonstrating more than 60% of patients were at least

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moderately specialized and that these patients, on average, specialized before age 12 years.<sup>12</sup>

Specializing in a single sport and playing a sport more than 8 months per year have been correlated with serious overuse injuries, anterior knee pain, and hip injuries.<sup>4,11</sup> An especially well-studied microcosm within youth specialization exists regarding youth baseball upper extremity injuries. Investigations have linked the number of pitches thrown, the number of innings pitched, and playing year-round to serious overuse injuries such as ulnar collateral ligament ruptures and physeal injuries.<sup>10,14,15</sup>

While the consequences of specialization are being studied, the motivation remains uncertain. Though intrinsic desires to excel are almost certainly present, approximately one-third of players were encouraged to continue playing by a coach or parent despite injury.<sup>16</sup> Approaching this issue requires an interdisciplinary team, including the patient, parents, and coaches. Identification of early specialization by the physician and caring for the patient beyond treating the overuse injury is also paramount.<sup>20</sup>

To best treat these young athletes, the impetus behind youth specialization must be more clearly identified. The goal of this study was to quantify the driving forces behind youth specialization. We hypothesize that multiple influences, including intrinsic drive for success and extrinsic pressures from parents and coaches, are responsible for youth athlete specialization.

## METHODS

Institutional review board approval was obtained, and a waiver to allow completion of the surveys without parental consent or supervision was granted. The survey instrument was generated by an interdisciplinary team, including orthopaedic surgeons, physical therapists, athletic trainers, and training academy instructors.

The survey consisted of 2 aggregate sections: a section on demographics and a section comprising 15 questions evaluating the factors influencing the player's engagement in the sport. Demographic variables included age, sex, self-described level of specialization, age on beginning to specialize, injury history, and surgical history. While the player's level of specialization was self-assigned, the impact of the specialization was assessed with 15 questions evaluating burnout, psychosocial factors such as intrinsic enjoyment, parental pressure, and time invested (hours per week, months per year, etc). Each of these questions was evaluated using a 5-point Likert-type scale, which was selected because of previously demonstrated strong comprehension in pediatric orthopaedic survey tools.<sup>18</sup>

The pilot instrument was administered to 30 consecutive 7- to 18-year-old patients during the senior author's office hours. Inclusion criteria consisted of age between 7 and 18 years, participation in an organized sport, English-speaking, and lack of mental disability. The age threshold for independent completion of the instrument was determined by the Flesch-Kincaid reading level, which was 4.0 (appropriate for a

Table 1. Youth specialization demographics (n = 235)

Age, y, mean ± SD	13.8 ± 3.0
Age starting sport, y, mean ± SD	5.9 ± 3.7
Age starting specialization, y, mean ± SD	8.1 ± 3.6
Male, %	57.9
Injury history, %	74.0
Surgical history, %	13.6
Favorite sport, %	
Soccer	20.9
Basketball	20.4
Baseball/Softball	16.2
Lacrosse	7.7
Cross-country/track and field	6.4
Other <sup>a</sup>	28.4

<sup>a</sup>More than 2% each: football, hockey, volleyball, swimming, tennis, and gymnastics.

9-year-old). Therefore, patients aged 10 years and older were instructed to complete the instrument in the absence of parents. However, patients between 7 and 9 years of age were allowed to consult their parents for assistance with the instrument.

After pilot administration, the final instrument was modified to optimize comprehension and esthetics. Patients were recruited both from the authors' office hours and from the school districts where the authors serve as team physicians. A study author was present during all recruitment sessions, and children aged 10 years and older completed the survey instrument in the absence of parents and coaches. Children 7 to 9 years of age were allowed to ask parents to help clarify questions. Eligibility criteria remained identical to pilot inclusion criteria. Incomplete responses were excluded from data analysis. The final study instrument is available in the Appendix (available in the online version of this article).

## Statistical Analysis

Responses were collected using independent survey software (Qualtrics). Chi-square tests of independence were used to assess the frequency of responses to the 5-point Likert-type scale questions between distinct cohorts of players (separated by injury history, age, and level of specialization). The chi-square test was selected in part because a nonparametric function is best able to evaluate the integers inherent to a Likert-type scale. Findings were deemed statistically significant if  $P < 0.05$ .

Table 2. Specialization survey responses by question type (n = 235)<sup>a</sup>

Question Regarding Aspirations	Just for Fun	Travel Team	Varsity	College	Pro
What is the highest level of play you hope to reach?	8.5	3.4	17.4	37.4	33.2
Questions Regarding Impact of Specialization	Never	Rarely	Sometimes	Often	Always
How often do you feel tired of your sport or that you want to quit your sport?	52.3	34.5	10.2	3.0	0.0
How often do you wish you could play more or different sports?	15.7	29.4	34.0	14.0	6.8
How often has your coach told you not to play other sports?	69.4	14.5	4.7	7.7	3.8
How often have your parents told you not to play other sports?	78.3	10.6	8.1	2.6	0.4
How often has your sport stopped you from being a better student?	50.6	30.2	17.4	1.3	0.4
How often has your sport stopped you from spending more time with your friends?	28.5	20.9	28.5	17.9	4.3
Questions Regarding Time Commitment of Primary Sport					
	0-3	4-6	7-8	9-10	11-12
How many months per year do you play your sport?	5.1	21.3	13.6	19.1	40.9
	0-1	2	3	4	5+
How many different leagues and clubs do you play your sport in per year?	40.9	39.1	13.6	3.4	3.0
	0-3	4-6	7-9	10-12	13+
How many hours do you spend playing and practicing?	14.0	28.1	16.6	18.7	22.6
	0-2	3-5	6-8	9-10	11+
How many hours of 1-on-1 practice do you receive from a coach?	78.3	18.3	3.0	0.0	0.4

<sup>a</sup>Values provided as percentages.

## RESULTS

The final instrument was administered to 254 patients, with 235 patients agreeing to complete the survey (92.5% participation rate). The mean age of players was  $13.8 \pm 3.0$  years (range, 7-18 years). Participants began specializing at a mean age of  $8.1 \pm 3.6$  years, and 74.0% of players reported having suffered a sports-related injury. Injury severity ranged from ankle sprains to operative conditions such as anterior cruciate ligament ruptures and ulnar collateral ligament ruptures. A summary of key demographic variables is provided in Table 1.

The level of player specialization was determined by self-assignment. Of the 235 players, 31.1% (n = 73) stated they focused on 1 sport only, 57.9% (n = 136) stated they played multiple sports but had a favorite, and 11.0% (n = 26) stated they like the sports they played equally.

Noteworthy responses from the 15-item survey are presented in Table 2. While a 1-5 Likert-type scale was utilized for all items, the response scales included both numerical and text scales depending on the given question. Of the 235 respondents, 70.6% of these youth athletes desired to play at the collegiate or professional level. More than 84% of these athletes

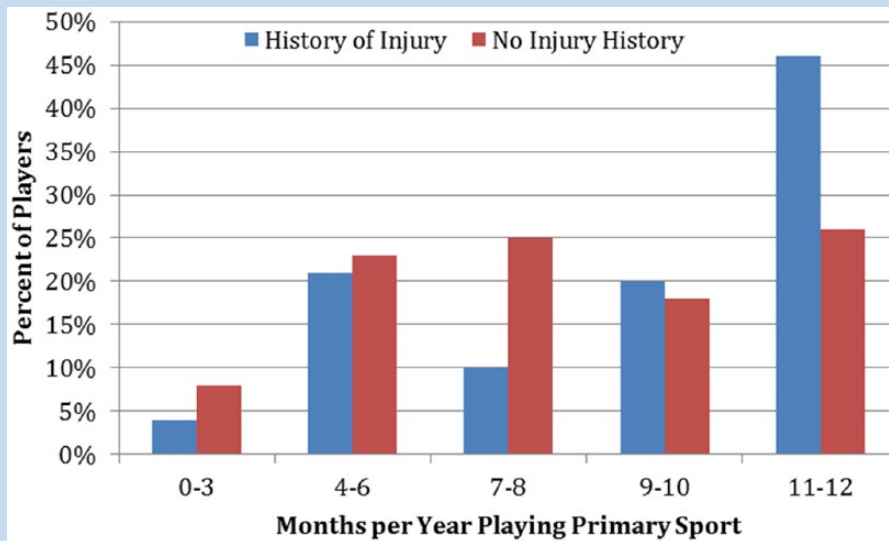


Figure 1. Months per year young athletes played their primary sports, as separated by injury history. Players with an injury history played significantly more months per year than those without.

at least occasionally wished they could play more sports. Approximately 30% of patients had been told by their coach not to play other sports, and 22% of players had been told by their parents not to play other sports. Approximately half of players believed their academics suffered from sports participation, and more than 70% of players had their social lives interrupted by their level of sports participation. Finally, 60% of these youth athletes played their respective favorite sport at least 9 months per year.

### Level of Specialization

The 74 athletes in the highest tier of specialization were more likely to have been often or always told by a coach not to play other sports than athletes who played multiple sports. While 22% of single-sport athletes reported being told not to play other sports by a coach often or always, only 8% of multisport athletes reported the same ( $P = 0.04$ ).

### History of Sports-Related Injury

Of the respondents, 174 (74%) reported suffering a sports-related injury. Players with an injury history were more likely to play 11 to 12 months compared with noninjured players ( $P < 0.01$ ), as 46% of injured athletes played year-round compared with 26% of noninjured athletes (Figure 1). Players with a history of injury were also more likely to state that sports have prevented them from being a better student. While 53% of injured athletes endorsed sports at least rarely interfering with their academic performance, only 38% of uninjured athletes reported the same ( $P = 0.04$ ).

### Responses Analyzed by Age of Athlete

Responses were also analyzed after stratifying by age, with 73 respondents aged 7 to 12 years and 163 respondents aged 13 to

18 years. Older athletes were told more frequently by their coaches to not play other sports. While 93.2% of younger athletes were told never or rarely to not play other sports, only 79.6% of older athletes reported the same ( $P < 0.01$ ). Older athletes were also more likely to report sports interfering with their academic performance. While 95.9% of younger athletes stated sports never or rarely hurt their studies, only 74.1% of older athletes reported the same ( $P < 0.01$ ).

## DISCUSSION

The incidence of overuse injuries in young athletes is increasing and now accounts for the majority of youth sports-related injuries.<sup>7,23</sup> Youth specialization has been correlated with increased injury risk, burnout, and decreased enjoyment of playing sports.<sup>6,9,17</sup> Despite these risks and major physician organizations advocating against early youth specialization,<sup>22</sup> many young athletes are specializing prior to beginning high school.<sup>4,12</sup>

Because the majority of these athletes desire to play collegiately or professionally, the balanced athleticism attained with multisport participation should be emphasized. By engaging in a diverse array of sports, the year-round participation that increases overuse injury risk<sup>13</sup> can be avoided. The athletic dexterity gained from multisport participation has also been shown to increase longevity in sports involvement.<sup>3,8</sup> Critically, among professional athletes, 97% stated that multisport participation contributed to their success in their chosen sports.<sup>21</sup>

Additionally, the extrinsic pressures on these elementary, middle school, and high school athletes must be addressed. Excess parental pressure contributes to burnout by increasing anxiety<sup>5</sup> and decreasing enjoyment.<sup>2,19</sup> These external

modifications adversely affect the developing youth athlete, and this study further quantifies the pressures placed on young athletes by parents and coaches. Approximately one-third of young athletes have been explicitly told not to play other sports by parents and coaches. Given this scale, physicians in both pediatrics and sports medicine should assess patients for signs of burnout in addition to physiologic overuse injuries.

The intrinsic drive of a young athlete to excel at a sport should be lauded and supported as a healthy pursuit. Lofty aspirations of potential collegiate or professional participation provide these children, adolescents, and teenagers a dream to work toward. However, extrinsic pressure from coaches and parents likely exacerbates the concerning trend of youth specialization. Overuse injuries and burnout are correlated with year-round participation and investing an age-inappropriate time commitment to structured practice.<sup>12</sup> Objective screening tools may help physicians, coaches, parents, and young athletes to recognize the early signs and symptoms of pathologic specialization.

The study has several limitations. The instrument used was created for this study and is not yet validated. The region of the country that the study was conducted in is notoriously competitive, and the findings in this segment of the country may not be representative of the nation as a whole. Additionally, by including athletes from a broad age range and from all sports, some specificity in identifying symptoms in targeted populations was likely lost. This aspect was inevitable in formulating a broadly-encompassing specialization assessment tool. Finally, the cross-sectional nature of the study does not provide insight into the longitudinal impact that the level of specialization has on a young athlete. As the athletes in this study began, on average, to specialize in their primary sport in elementary school, following patients from age 7 years onward would likely provide tremendous insight into the holistic impact that athletic specialization has on a child.

## CONCLUSION

Young athletes experience both intrinsic and extrinsic motivations in focusing on a single sport. While the inherent drive to succeed and reach higher levels of competition may represent healthy aspirations, additional pressures from coaches and parents were also identified. These psychosocial determinants must be carefully dissected by parents, coaches, and physicians to protect the mental and physical health of young athletes. By acutely delving into the reasons behind specialization rather than solely treating overuse injuries,

doctors, parents, and young athletes will be better equipped to address youth overuse injuries.

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