

# The Effects of Early Sport Specialization on Overuse Injuries in the Pediatric Population: a Systematic Review

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## Background

- Approximately 60 million children in the United States from ages 6-18 participate in organized sport<sup>1</sup>
- From 1997-2008 there was an increase from 9% to 12% in the number of children under 7 participating in organized sport<sup>1</sup>
- Early specialization in sport is on the rise with the thought that this could lead to an increased chance of reaching an elite level of play<sup>1,2</sup>
- Several studies have suggested that early diversification in sport may lead to a higher level of play than specialization<sup>1</sup>
- Though not the focus of this review, other studies have found that early sport specialization increases the risk of social isolation & burnout from increased psychological stress and can lead to quitting sports early, opposite of what early specialization is trying to achieve<sup>3,4</sup>

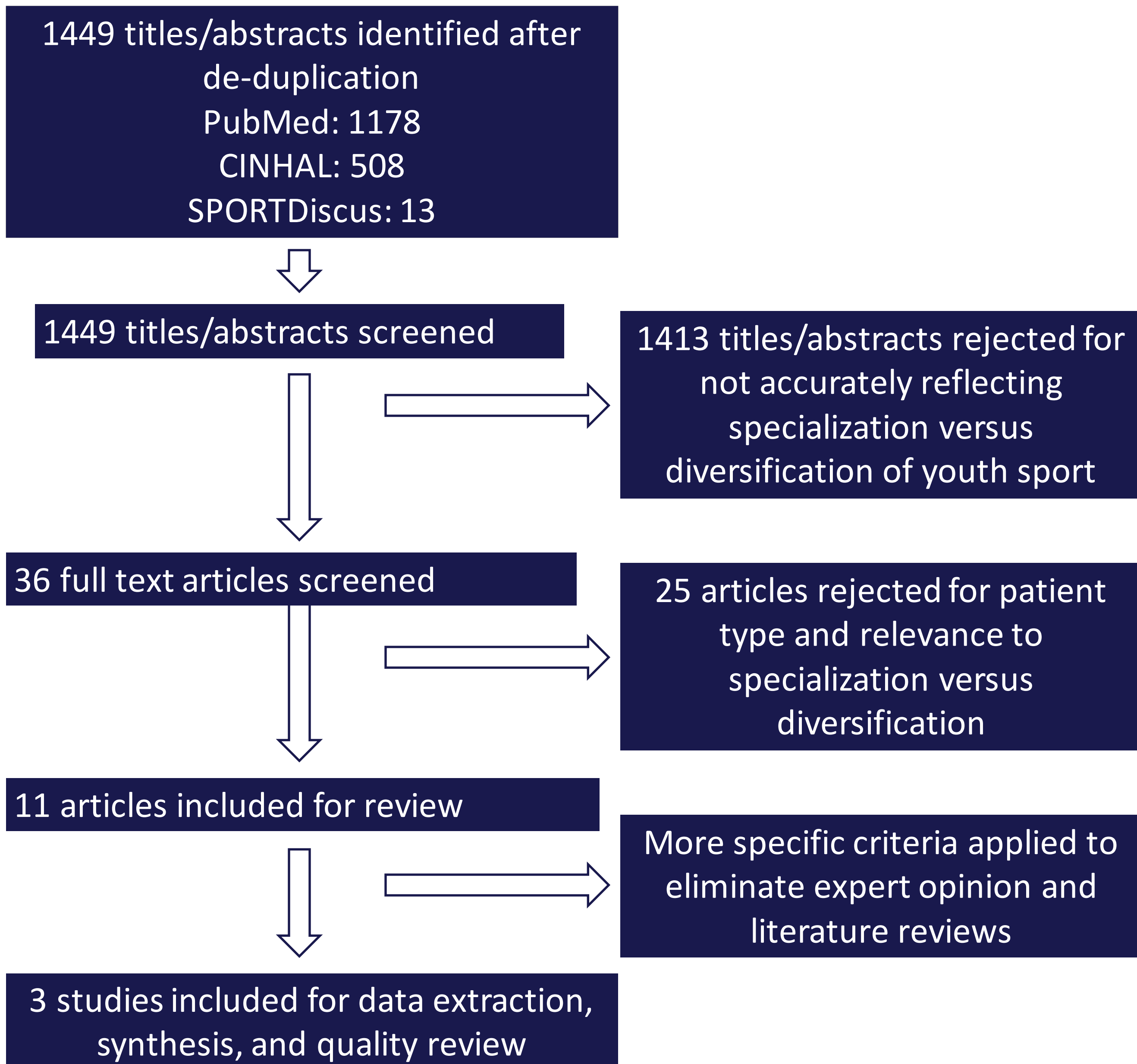
## Purpose

The purpose of this study was to systematically review the literature regarding whether early sport specialization leads to a higher rate of overuse and chronic injuries in the pediatric population.

## Methods

- Inclusion Criteria: studies researching typically developing children between the ages of 4-21 participating in sport, either specialized or diversified, that have experienced a sports related injury
- Exclusion Criteria: participation in baseball or American football, non-accidental traumatic injuries and concussions
- A duplicate process of screening for eligibility and inclusion was performed
- Levels of evidence were determined by study design

## Flow Diagram



## Analysis

Results of the three articles were analyzed for statistical and clinical significance. Consensus between articles as well as individual findings in each study. These studies were unique in reporting collected data and not relying exclusively on expert opinion, strengthening the ability to draw conclusions.

## Results

### Study Overview Table

Authors	Year	Population	Study Design	Level of Evidence	Duration	Activity
Baxter-Jones, A; Maffulli, N; Helms, P.	1993	N=453 231 boys, 222 girls	Mixed longitudinal (prospective study)	2b	3 years	- gymnastics - football/ soccer - swimming - tennis
Malisoux, L; Frisch, A.; Urhausen, A.; Seil, R.; Theisen, D.	2013	N= 154 (12-19 years old) from regional sport schools	Prospective cohort follow up	2b	41 weeks	15 sport disciplines: 3 categories: - team - racket - individual
Hall, R.; Foss, B.; Hewett, T.; Myer, G.	2015	546 public school females (> 1 year participation) 357 multiple sport 189 single sport	Retrospective cohort epidemiology study	2b	Not Reported	- basketball - soccer - volleyball

### Study Exposure Table

Author	Early Specialization Definition	Sports Injury Definition	Frequency of Participation	Intensity
Baxter-Jones, A.; Maffulli, N.; and Helms, P.	Not reported	"One which occurred as a result of participation in sport which had one or both of the following consequences: (1) a reduction in the amount or level of sports activity or (2) need for treatment or advice."	Not reported	Not reported
Malisoux, L; Frisch, A.; Urhausen, A.; Seil, R.; and Theisen, D.	Not reported	"Physical complaint resulting from a match or training that forces the athlete to interrupt or modify his/her usual training plan for at least one training unit"	2 daily training sessions; Total volume of sport in minutes	Training intensity on 4 point scale: light, moderate, intense, very intense transferred to RPE scale for validity
Hall, R.; Foss, B.; Hewett, T.; Myer, G.	Participation in only one sport (for at least 1 year)	Not reported	Not reported	Not reported

## Results

### Study Outcomes Table

Authors	Outcome
Baxter-Jones, A; Maffulli, N; Helms, P.	40% injuries attributable to training and competition; most injuries occurred in training vs. competition except for soccer; On average overuse injuries required more missed training time
Malisoux, L; Frisch, A.; Urhausen, A.; Seil, R.; Theisen, D.	Higher intensity week prior to injury (significant finding) Sport category is prime factor to consider with injury incidence
Hall, R.; Foss, B.; Hewett, T.; Myer, G.	Sport specialization increased risk of PFP in female adolescents; Apophyseal injuries 4 times greater in sport specialization

### Study Comparison Table

Consensus Between Studies	Individual Study Findings
<ul style="list-style-type: none"> <li>• All studies report the need for further research</li> <li>• The two studies that reported on gender found no statistically significant gender based differences in the rate of sustaining an injury</li> <li>• Two studies conclude greater incidence of injury in team vs. individual or racket sports</li> </ul>	<ul style="list-style-type: none"> <li>• Hall et al. reported an association between early specialization in female athletes and higher risk for patellar injury</li> <li>• Baxter-jones et al. reported that the majority of acute/traumatic injuries, except in swimming, occurred in extracurricular activities rather than from overuse during specialization</li> <li>• Malisoux et al. reported higher intensity training the week prior to injury</li> </ul>

## Conclusions

Although the pool of research is small, the available evidence suggests that early sport specialization may have a negative effect on young athletes. This in combination with evidence that early specialization does not improve the odds of reaching an elite level of sport suggests that the increased risk of injury associated with early specialization may not be justified. More studies with longer follow-up as well as a more uniform definition of "early specialization" are needed to better understand the relationship between early sport specialization and the risk of overuse injury.

## Clinical Relevance

- Physical Therapists should be aware of the risks associated with early sport specialization and intensity of training in the pediatric population
- Providing appropriate recommendations to patients and their families in regards to early specialization may be instrumental in preventing overuse injury
- This research has the potential to aid in developing guidelines for intensity and quantity of participation in youth athletics

## Acknowledgements / References

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 References:  
<sup>1</sup>Feeley, B. T., Agel, J., & LaPrade, R. F. (2015). When Is It Too Early for Single Sport Specialization? *The American Journal of Sports Medicine*. <http://doi.org/10.1177/0363546515576899>  
<sup>2</sup>Hall, R., Barber Foss, K., Hewett, T. E., & Myer, G. D. (2014). Sports Specialization is Associated With an Increased Risk of Developing Anterior Knee Pain in Adolescent Female Athletes. *Journal of Sport Rehabilitation*. <http://doi.org/10.1123/jsr.2013-0101>  
<sup>3</sup>Jayanthi, N., Pinkham, C., Dugas, L., Patrick, B., & Labella, C. (2013). Sports specialization in young athletes: evidence-based recommendations. *Sports Health*, 5(3), 251-257. <http://doi.org/10.1177/1941738112464626>  
<sup>4</sup>Malina, R. M. (2010). Early sport specialization: roots, effectiveness, risks. *Current Sports Medicine Reports*, 9(6), 364-371. <http://doi.org/10.1249/JSR.0b013e3181fe3166>  
<sup>5</sup>Valovich McLeod, T. C., Decoster, L. C., Load, K. J., Michell, L. J., Parker, J. T., Sandrey, M. A., & White, C. (2011). National Athletic Trainers' Association position statement: prevention of pediatric overuse injuries. *Journal of Athletic Training*, 46(2), 206-220. <http://doi.org/10.4085/1062-6050-46.2.206>