

# THE LEARNING CURVE

Little League® Seeks to Address Concerns, Answer Questions about Curveballs & Overuse



Study conducted by University of North Carolina Department of Exercise and Sports Science, with research funding provided by the Yawkey Foundations



# **Table of Contents**

## **When Aches & Pains Become Serious Enough for Surgery**

What begins as a small, nagging ache or pain can grow into a debilitating injury if it isn't recognized and treated early.

## **An Ounce of Talent Requires a Ton of Common Sense**

Youth baseball players, displaying an aptitude to pitch, have quickly moved from occasionally pitching on a recreational level to participating in more competitive situations.

## **Study Overview: Test Groups Defined for Arm Injury Research**

More than 400 pitchers were surveyed each year for five years to assess their pitching methods, techniques, pain presence, and injury occurrence.

## **Study Findings: Analysis of the Data Provides Interesting Results**

The study reveals the clear correlation between travel teams and "showcases" to the incidence of overuse injuries.

## **Summary of Recommendations: Where Do We Go From Here**

Six points of recommendation relevant to the education and general well being of youth pitchers.

## **Conclusion: Education, Proper Rest Best Deterrent to Avoid Injury**

The primary cause of arm injuries is overuse, not type of pitch.

## **Acknowledgements**

## **For More Information**

# *The Learning Curve:*

## **Little League Seeks to Address Concerns,**

## **Answer Questions about Curveballs & Overuse**

**B**aseball pitchers have been attempting to deceive hitters by throwing curveballs since the 19<sup>th</sup> Century, and youth pitchers have emulated their adult counterparts since before Little League Baseball was founded in 1939. From Little League's first season, no substantive research had been conducted and no data collected, that described how adolescent athletes were impacted by throwing curveballs, and if a circumstance exists where throwing too much increases the risk of injury.

Little Leaguers have been throwing curveballs, and lots of them, for more than seven decades. While children were throwing curveballs, arm injuries that might have required drastic measures like "Tommy John" surgery were confined mostly to grown men. Today, that has changed. Pre-teens are having orthopedic surgery to repair damage from pitching.

So what's different now? That's the question Little League set out to answer in April 2006.

*With the onset of specialization in organized youth sports – primarily baseball – came the first signs of the dangers that are associated with "overuse."*

---

### **When Aches & Pains Become Serious Enough for Surgery**

With the onset of specialization in organized youth sports – primarily baseball – came the first signs of the dangers that are associated with "overuse." There are two types of overuse injury: traumatic (acute) injuries or repetitive (chronic) injuries.

Acute pain and injury is usually the result of a specific impact or traumatic event. On the other hand, chronic pain from repetitive injuries tends to have subtle or vague symptoms that develop slowly. What begins as a small, nagging ache or pain can grow into a debilitating injury if it isn't recognized and treated early. Repetitive injuries are the result of repetitive use, stress and trauma to the soft tissues of the body (muscles, tendons, bones and joints) with not enough time for proper healing. They are sometimes called cumulative trauma, or repetitive stress injuries.

Little League Baseball became the first national youth baseball organization to adopt the pitch count (in 2008), instead of the number of innings pitched, as a more accurate way to measure the use of the pitching arm.

Little League has relied on the expert advice and counsel of Dr. James Andrews, Founder and Medical Director of the American Sports Medicine Institute (ASMI); and Dr. Glenn Fleisig, Research Director at ASMI for the development of its groundbreaking pitch count rules. Dr. Andrews, who currently serves on the Little League International Board of Directors, and Dr. Fleisig are two of the world's most knowledgeable and respected authorities on pitching injuries.

---

## **An Ounce of Talent Requires a Ton of Common Sense**

An adolescent throwing a high numbers of pitches and not observing adequate periods of rest and recovery can experience acute pain. The repetitive motion of pitching – with insufficient time for rest and recovery - can develop into chronic pain.

Recent generations of youth baseball players, displaying an aptitude to pitch, have quickly moved from occasionally pitching on a recreational level to participating in more competitive situations. The creation and evolution of “elite” or “select” baseball teams and leagues, if coupled with little or no regulation or regard for the health of the adolescent athlete, has the potential to increase the risk of invasive treatment and/or surgery, once reserved for adults.

To gain an understanding of the scope of injuries sustained by pitchers and the risk factors, Little League Baseball and Softball, the largest youth sports organization in the world, in collaboration with USA Baseball, the governing body of amateur baseball in the United States, and the Department of Exercise and Sport Science at the University of North Carolina in Chapel Hill, conducted a study of pitching arm injuries in youth baseball.

Through a grant from the Yawkey Foundations, a study was commissioned to determine the physical effects that throwing breaking pitches has on the bodies of adolescent players. Little League wanted to find out if the curveball was the culprit it was perceived to be.

*Little League has relied on the expert advice and counsel of Dr. James Andrews and Dr. Glenn Fleisig for the development of its groundbreaking pitch count rules.*

The aim of this five-year research project was to describe the prevalence and epidemiology of pitching arm injuries and examine the risk factors. This was accomplished by recruiting three separate groups of baseball pitchers to be followed over the study period.

## **Study Overview: Test Groups Defined for Arm Injury Research**

A test group of Little League pitchers (ranging in age from 8-to-13; total: 410) was recruited in 2006 and followed for four additional years through 2010. A high school-age test group of pitchers (total: 293) was recruited in 2007 and followed three additional years through 2010. Finally, a college-age test group of pitchers (total: 629) was recruited in 2008 and followed two additional years through 2010.

The pitchers were surveyed each year to assess their pitching methods, techniques, pain presence, and injury occurrence. The factors acquired from this data were then analyzed to assess which factors influenced pitching injury risk.

## **Study Findings: Analysis of the Data Provides Interesting Results**

- ❖ A previous history of injury predisposes young athletes to over five times (5x) greater risk of incident injury at both the elbow and shoulder joints.
- ❖ The average number of innings pitched per game is a risk factor for shoulder injury in youth baseball pitchers.
- ❖ Pitch count programs reduce the risk of shoulder injury in Little League Baseball by 50 percent.
- ❖ Many pitchers in the current study pitched in two leagues at the same time. Local Little Leagues programs have no mechanism for monitoring this cross-league play.
- ❖ Pitching in travel ball “elite” and “select” programs and pitching in “showcase” events were associated with an increased risk of elbow and shoulder injury for those who also pitched in Little League Baseball and high school pitchers.

*The relationship between age, type of pitch, and injury risk is complex, but there was no evidence that throwing a breaking pitch at an early age was an injury risk factor.*

- ❖ The relationship between age, type of pitch, and injury risk is complex, but there was no clear evidence that throwing breaking pitches at an early age was an injury risk factor.

The study reveals the clear correlation between travel teams to the incidence of overuse injuries.

Nearly one quarter of the youth pitchers threw on travel ball teams and in Little League at the same time. The statistics show that pitching in multiple programs at the same time increases the opportunity for injury.

Nearly one out of every five Little League pitchers (19 percent) reported pain in the elbow and/or shoulder in the previous 12 months. Most telling is the percentage of Little Leaguers who pitched with pain in the elbow, shoulder, or arm and the correlations of that pain to travel ball participation.

Twenty percent of the players throwing for travel ball teams or pitching in “showcase” events described pain.

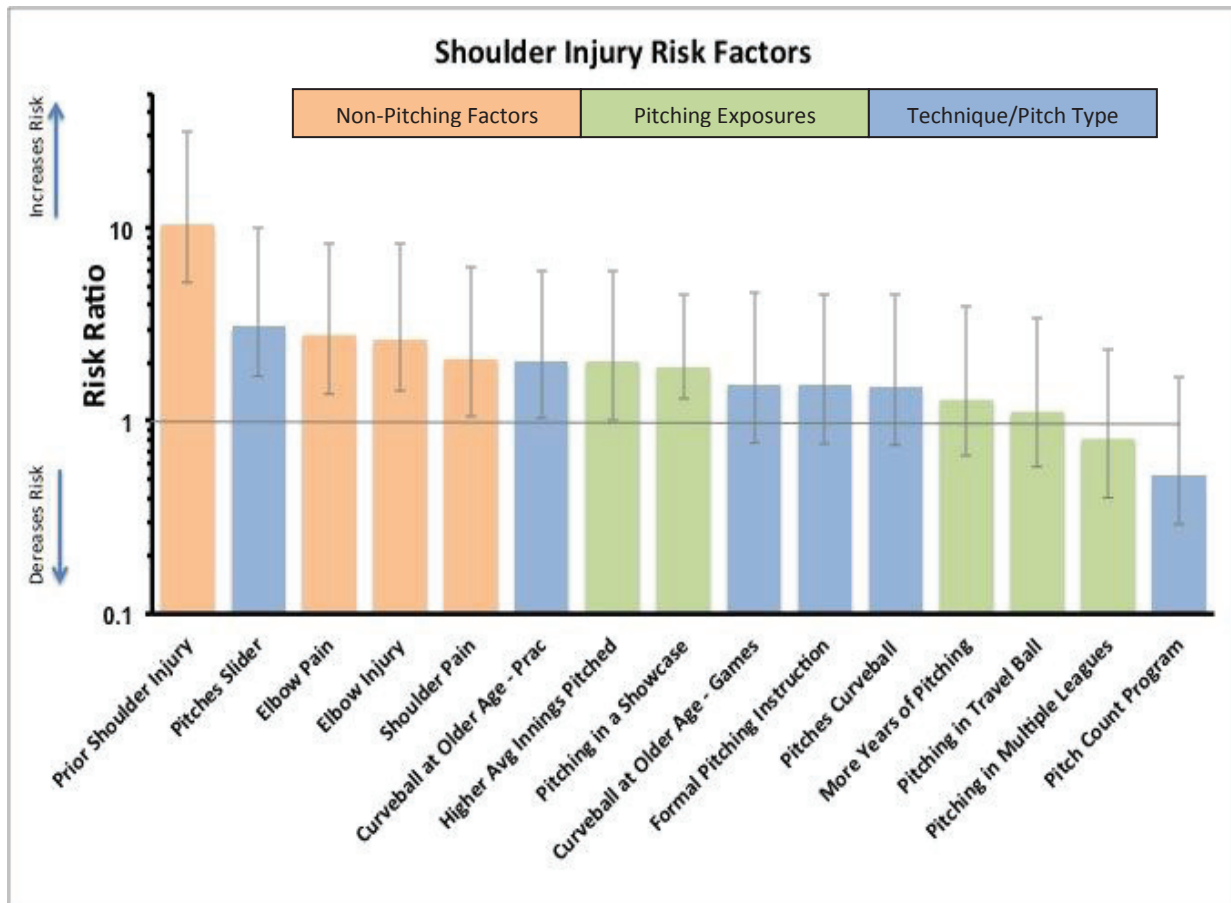
According to the findings, the baseline risk factors for injury to Little League-age pitchers did not point directly to throwing curveballs. Children who pitched a higher number of innings, and/or had a history of shoulder or arm injuries all were at a higher risk for suffering arm injuries.

*Children who pitched a higher number of innings and/or had a history of shoulder or arm injuries all were at a higher risk for suffering arm injuries.*

Pitching without adequate rest and recovery time is likely the culprit in most cases. Proper medical treatment and recovery time following an initial injury to a pitcher’s arm, elbow or shoulder is widely considered to be crucial in lowering the chances of a similar repeat injury.

The research also focused on players at the high school and collegiate levels. An increase was discovered in the incidence of injury from Little League to high school, and high school to college. The data indicated that the number of pitching-related injuries doubled between Little League (ages 8-to-13) and High School, mostly due to the higher number of innings and pitches thrown.

Many confirmations were gleaned from the study, including the acknowledgements that mandatory pitch counts are key to injury prevention and should be continued and even strengthened. Explaining to coaches, parents and players the high risk and limited reward of travel ball and showcases also was high on the list.



- Risk factors ordered from highest to lowest.
- Risk ratios above one (1) increase risk; Risk ratios below one (1) decrease risk.

## Summary of Recommendations: Where Do We Go From Here

- Primary prevention of injury and correct rehabilitation from injury is very important.
- Mandatory pitch counts are an important injury prevention program in Little League Baseball.
- Consideration should be given to adoption of pitch count programs in other youth baseball leagues and in high schools.
- There should be more education for coaches, parents and athletes about the risks associated with travel ball and showcases.



- Good coaching on correct pitching technique, and parent and athlete education of the importance of correct technique, are important means of injury prevention for pitching arm injury.
- Based on the currently available data, there is not a clear case for limiting the type of pitch thrown by age, provided good coaching is available to all.

## **Conclusion: Education, Proper Rest Best Deterrents to Avoid Injury**

The study's final two recommendations have long been a part in Little League safety initiatives: education at all levels of baseball, especially the youngest levels, including coaching correct technique; and parent awareness of injury prevention programs. For Little League, it's a good feeling to receive confirmation that doing what's right is still more important than doing what's popular.

Some within the baseball community have advocated for a ban on curveballs. However, the study conclusions do not clearly support such a ban. Furthermore, a ban on breaking balls would not be simple to put into practice. How does a volunteer Little League manager, coach, or umpire know when a player is throwing a curveball? With such a wide range of aptitude and ability, it's practically impossible to judge if any youth pitcher intended to throw a curveball or if that's just how the ball came out of the pitcher's hand. To task our dedicated volunteers with judging the type of pitch thrown is not only unfair, it would be impractical.

*For coaches and parents, armed with the information in this report, the decision on when and how to teach the curveball is a matter of preference and education.*

Even if Little League were to find a practical way to ban curveballs in our program, they would remain a part of the game for children playing outside our program, as they have been for decades. For coaches and parents, armed with the information in this report, the decision on when and how to teach the curveball is a matter of preference and education.

Medical doctors, trainers and pitching coaches all support the importance of proper stretching, warm-ups, and cool downs for a pitcher on a game-by-game basis. Regardless of any specific routine, the consensus among experts is that education on proper pitching technique, an



appreciation of adequate rest periods, and the need to properly stretch and warm-up the arm are essential to maintaining the health of any pitcher, no matter what their age.

That is why these elements are part of the Pitching Education section available through the Little League Coach Resource Center – an online guide to coaching techniques and drills that we make accessible to anyone, anytime – free of charge.

## **Acknowledgements**

Little League International wishes to thank the University of North Carolina's Department of Exercise and Sport Science, and the study's principal investigators Frederick O. Mueller, Ph.D., Dept. of Exercise and Sport Science, University of North Carolina; Stephen W. Marshall, Ph.D., Department of Epidemiology, University of North Carolina; and the late Dr. Barry Goldberg, a former member of the Little League International Board of Directors, and Director of Sports Medicine for Yale University's Health Services, who championed this study.

And we in particular thank the Yawkey Foundation for providing funding for this study. The Yawkey Foundation has had a long history of support for Little League initiatives, and we are grateful for it.

## **For More Information:**

### **Little League Baseball and Softball**

<http://www.LittleLeague.org>

### **Little League Coach Resource Center:**

[http://www.littleleague.org/managersandcoaches/Coach\\_Resource\\_Center.htm](http://www.littleleague.org/managersandcoaches/Coach_Resource_Center.htm)

### **Little League ASAP (A Safety Awareness Program)**

<http://www.littleleague.org/learn/programs/asap.htm>

### **Yawkey Foundations**

<http://yawkeyfoundation.org/>

### **STOP Sports Injuries**

<http://www.stopsportsinjuries.org/>

### **USA Baseball Medical/Safety Advisory Committee**

[http://web.usabaseball.com/news/article.jsp?ymd=20080618&content\\_id=33889&vkey=news\\_usab](http://web.usabaseball.com/news/article.jsp?ymd=20080618&content_id=33889&vkey=news_usab)



**LITTLE LEAGUE. INTERNATIONAL • BASEBALL AND SOFTBALL**  
539 U.S. Route 15 Highway • P.O. Box 3485 • Williamsport, PA 17701-3485 • 570-326-1921 • Fax: 570-326-1074

[www.LittleLeague.org](http://www.LittleLeague.org)

Become a fan: [www.facebook.com/LittleLeagueBaseballAndSoftball](https://www.facebook.com/LittleLeagueBaseballAndSoftball)

Follow us: [www.twitter.com/LittleLeague](https://www.twitter.com/LittleLeague)