

Abstract

In the history of Major League Baseball, no rule change has been so dramatic, and so controversial, as the introduction of the pitch clock. Since its adoption in AA and AAA baseball before the 2015 season, and its implementation in the majors before the 2023 season, the pitch clock has been a significant shift to increase baseball's pace of play. While this has led to an increase in the interest of the game, it has also fueled a growing debate over its contribution to another growing issue, pitching arm injuries.

During the 2023 season alone, 93 professional pitchers received Tommy John surgery, a staggering number when compared to the entire decade of the 1990s where 109 professional pitchers received the surgery. However, as this submission will discuss, the introduction of the pitch clock speaks more to another massive shift in baseball, the emphasis on velocity. Additionally, both the pitch clock and rise velocity have had relatively negligible effects at the Major League level. What this submission will argue is that the rise in velocity has seen its true effects at the youth level of baseball. This submission will then review current efforts by youth baseball organizations, arguing that more can be done to update these guidelines and to better protect young pitchers as the game of baseball continues to evolve.

Big Change for Little League: Why Changes in the MLB Require Little League to Change Their Pitching Rules

Grant Haffenden and Shelby MacSwan

Introduction

In the history of Major League Baseball, no rule change has been as dramatic, and as controversial, as the introduction of the pitch clock. Since its adoption in AA and AAA baseball for the 2015 season,¹ and its expansion to the majors starting in the 2023 season,² the pitch clock has been a significant shift to increase baseball's overall pace of play. The desired change has paid off as the average time of a nine-inning MLB game was two hours and thirty-six minutes for the 2023 season, down twenty minutes from 2022.³ The change has been celebrated by MLB executives as well with attendance numbers growing during the 2023 and 2024 seasons.⁴

However, the change has also been at the center of another rising statistic in baseball; Tommy John surgeries. During the 2023 season alone, ninety-three professional pitchers received Tommy John surgery as compared to 109 professional pitchers who received the surgery during the entire decade of the 1990s.⁵ This has led to a war of words between the MLB and the MLB Players Association regarding how much of an effect the clock has on the rise in this surgery in pitchers, especially high profile pitchers, over the past two seasons.⁶

While the pitch clock arguably plays a role in pitching arm injuries, its introduction speaks more to a massive shift in the way pitching has changed over the last fifteen years. Major League teams have invested heavily in pitchers who are producing consistent strikeouts and high velocity pitches. The evolution of starting pitcher salaries over recent years demonstrates this change. Starting pitchers in 2024 have 36 of the top 100 contracts, compared to in 2011 when only 28 pitchers were in the top 100 contracts.⁷ Similarly, in 2011 the average of the top 10 infielder

salaries and the average of the top 10 outfielder salaries were higher than the average of the top 10 starting pitcher salaries.⁸ Today, the top 10 average pitcher salaries are higher than both the infield and outfield, with that average being over \$1 million higher than the average of the top ten infield contracts, and over \$4 million higher than that of the top ten outfield contracts.⁹ As organizations invest more heavily in their starting pitchers, it becomes necessary for there to be increased concern for the health of these pitchers and the longevity of their careers.

In particular, the rise in pitching power and the emphasis on getting strikeouts, over putting the ball in play, have been just as, if not more relevant, to the rise of injuries. The rise has been relatively negligible in Major League pitchers,¹⁰ but the real effects have become more prevalent at a youth level. This paper will argue that not enough is being done to protect youth pitchers by first looking at the recent shifts in pitching that have occurred at the Major League level. Next, this paper will discuss how these shifts have translated to the youth level, starting at the Little League level and continuing through high school. Finally, this paper will review efforts by youth baseball organizations to address the issue and discuss potential policy revisions for these organizations.

Tommy John and MLB's Resilience

September 2024 marked fifty years of the revolutionary procedure known as Tommy John surgery, or Ulnar Collateral Ligament ("UCL") reconstruction.¹¹

Prior to the introduction of the surgery, a torn UCL, sometimes referred to as "dead arm," was a death sentence for the careers of Major League pitchers.¹² However, in 1974, Dr. Frank Jobe began to figure out a way for "dead arm" pitchers to make their return to the game. Dr. Jobe had begun pioneering a procedure that would take a tendon, called a graft, harvested from a tendon in another part of the body that would then replace the UCL, stabilizing the elbow and returning the full range of motion to a player.¹³ Despite Dr. Jobe's belief that the surgery had a one percent

chance of success, Los Angeles Dodgers pitcher Tommy John agreed to have the surgery performed after tearing his UCL during the 1974 season.¹⁴ After a year of recovery, the surgery proved successful, with John continuing his MLB pitching career until 1989.¹⁵ As of 2024, the surgery that Dr. Jobe believed had a one percent chance of success has been performed on over thirty percent of current Major League pitchers, as well as hundreds of Minor League, college, and youth athletes.¹⁶ The surgery now has more than a ninety percent success rate of returning these players to the playing level they were at prior to surgery.¹⁷

Despite the regularity and success of the surgery, there is still a very public fear from the MLBPA over the introduction of the pitch clock and the rise of Tommy John surgery.¹⁸ However, it seems that the pitch clock is just another factor that plays a part in the rise of the surgery. The change in emphasis in the game of baseball, particularly around velocity, plays just as much, if not more, of a role in the rise of Tommy John surgeries.

Before emphasizing the other factors, it should not be ignored that a pitch clock does play some role in arm injuries, but how much of an impact remains to be seen. Around the time that MLB began to experiment with the pitch clock in the minor leagues, Mike Sonne and Peter Keir used computer simulations to conclude that the pitch clock, along with other pace of play rules, will increase the fatigue in the forearm and put joint stability at a more heightened risk.¹⁹

Additionally, a 2016 study from Taiwan used seven college pitchers to actually test the effects of the pitch clock on human arms.²⁰ Using different pitch clock intervals, the study found that a pitch clock closer to the twenty second timer that MLB originally introduced with runners on base was the most viable.²¹ The faster the interval was, the more the study found that notable muscle inflammation would linger in the pitcher's elbow.²²

Another study addressed concerns over the pitch clock more biologically. The research explained that pitchers heavily rely on the body's Adenosine Triphosphate-Creatine Phosphate system to recuperate from quick and intense movements during a pitch.²³ That system is approximately fifty percent restored after twenty seconds, but reaches eighty seven percent recovery after one minute.²⁴ This indicates that, in theory, the pitch clock does not afford pitchers' bodies enough time to recover on a cellular level, heightening the risk for fatigue and injury in the long term.²⁵ While this study admits there is no current correlation between the pitch clock and elbow injuries, the authors express concern and encourage further monitoring in the long term.²⁶

The impact the pitch clock has on injuries is currently not clear. One of the most important factors is the general rise of velocity across all pitches. Despite a sharp decline in the number of four-seam and two-seam fastballs, what has not declined is the general rise in velocity.²⁷ Major League Baseball began tracking every pitch thrown starting in 2008, when the average four-seam fastball was just under 92 mph.²⁸ By 2023, that average had climbed to just over 94 mph.²⁹ Joel Zumaya was the most powerful pitcher in Major League Baseball in 2008, with a four-seam fastball that averaged just over 98 mph.³⁰ In the eight years between 2015 and 2023 alone, the number of Major League pitchers who were able to pitch over 100 mph rose to thirty-one percent.³¹

The numbers are just as notable for off-speed, breaking pitches, such as sliders and curveballs that require even more torque and strain on a pitcher's arm.³² In 2008, the average slider velocity was 83.4 mph.³³ By 2023, that average climbed up to 85.2 mph.³⁴

Another factor that has contributed to the concerning rise in arm injuries among Major League pitchers is an increased emphasis on strikeouts, over fielding outs. The main driver of all of this has been the rise of "Moneyball" analytics, with statisticians realizing that pitchers had little control of the results once a ball was put into play.³⁵ Using the same PITCHf/x data that was

formally adopted by MLB in 2008, organizations began to realize that it was breaking pitches, not fastballs, that would need to be utilized more to have the ball be put into play less.³⁶ Further research provided teams with the realization that attacking the strike zone on a north-south plane with faster breaking pitches would be more effective than fastballs or slower breaking pitches that attacked the traditional east-west plane of the strike zone.³⁷

The results from this overall shift have been staggering. In 2008, the average strikeout per nine innings pitched sat at 6.77.³⁸ By September 2024, that number reached 8.41.³⁹

It is also important to note that Tommy John surgery has little, if any, detrimental impact upon a Major League pitcher's velocity and corresponding salary. The surgery, which requires an extended recovery time of nine to twelve months, is still a significant procedure.⁴⁰ However, the after effects of the surgery are relatively minimal at the Major League level.

There is strong evidence that a pitcher's velocity will not decrease, and may even increase following the surgery.⁴¹ This makes sense due to a pitcher experiencing a deteriorating UCL, but still being able to perform until the pain becomes too much.⁴² Once the pain is gone and the UCL is fully repaired, the pitcher is then able to return to their peak performance, and possibly, exceed it.⁴³

This is highlighted through Tampa Bay Rays pitcher Shane Bieber, who had the surgery at the end of the 2022 season.⁴⁴ Throughout the 2022 season, Bieber's fastball clocked an average of 96 mph, putting him in the 84th percentile amongst other pitchers.⁴⁵ Bieber fully returned for the 2024 season in which his fastball velocity averaged 95.6 mph, putting him in the 76th percentile.⁴⁶ Recent World Series hero Walker Buehler saw similar results even after having a second Tommy John surgery, seeing his average fastball velocity in 2021 sit at 95.3 mph and then stay relatively

the same during the 2024 season at 95 mph.⁴⁷ Baz and Buehler represent just a small sample size of an overall trend that a pitcher's velocity is not affected after having Tommy John surgery.⁴⁸

There is also no indication that having Tommy John surgery affects a starting pitcher's future salary potential, either. In 2024, six of the top ten highest paid starting pitchers have had at least one Tommy John surgery at some point in their careers.⁴⁹ All six had Tommy John surgery prior to signing their top ten contract.⁵⁰ Major League Baseball's highest paid player of all time, Shohei Ohtani, had two Tommy John surgeries before signing his \$700 million contract in 2023.⁵¹ While he did not pitch in 2024, he is expected to be fully recovered and return to the mound next season.⁵²

While the exact correlation between the recent changes in baseball and the incidence of Tommy John surgeries remains in dispute, there has been an inevitable trickle-down effect into younger levels of baseball. Many of the issues we see in the Major Leagues have made their way into youth baseball, warranting even more concern.

Concerning Trends at the Youth Level

The Major League's increased emphasis on pitching power and velocity has now shown up in the younger levels of the sport. Nowhere is that more prevalent than when examining the changes in the Little League World Series.

First held in 1947, the Little League World Series represents the highest level of youth baseball.⁵³ It also represents a strong correlation with the current trends of Major League pitching. For example, the 2010 version of the Little League World Series saw a mean fastball velocity of 72.5 mph.⁵⁴ Fast forward thirteen years later, and the pitchers overwhelmed Little League batters, with Chinese Taipei's Fan Chen-Jun registering pitches well over 80 mph.⁵⁵

Another worrisome trend at the Little League level is the rise in breaking pitches, however the impact breaking pitches have on a youth pitcher's arm remains in consistent debate. Just as hitters at the Major League level have become accustomed to sitting on fastballs, so have Little League hitters, forcing Little League pitchers to experiment more with breaking pitches.⁵⁶ Like the MLB, Little League managers have also begun to stress to their pitchers the effectiveness of having a breaking pitch in order to strike more batters out and keep them off balance.⁵⁷ However, the impact of breaking pitches on the arm strain of developing arms is still a topic of debate. Some sports scientists continue to recommend that youth pitchers avoid throwing breaking pitches until they reach thirteen or fourteen years old, with some coaches agreeing that breaking pitches should not be thrown until high school.⁵⁸ On the other hand, studies conducted in conjunction with Little League Baseball have argued that there are minimal to no differences in the amount of stress put on an arm when a young pitcher throws a fastball or a breaking pitch.⁵⁹ These studies have gone on to argue further that the fastballs, and not breaking pitches, are the ones most dangerous to youth arms.⁶⁰ Overall, even if there was a strong correlation between breaking pitches and youth arm injuries, it would be hard to police as more of an emphasis is placed on these types of pitches at an early age.⁶¹

The final concerning factor at a Little League level is the issue of pitching overuse. Like many youth sports, baseball has become a year round activity, with kids playing on multiple teams in multiple different leagues.⁶² In the same studies that questioned the amount of harm breaking pitches had on youth arms, the one factor they did agree on was that overuse was a primary cause in the rise of youth arm and shoulder injuries.⁶³ The effects of overuse, coupled with a stronger emphasis on velocity, have led to nearly forty percent of youth pitchers coming down with some degree of arm injury.⁶⁴ Continued stress through factors such as showcases, more access to radar

guns, and poor mechanics have continued to worry medical professionals about the effects overuse has on developing growth plates in the arm and shoulder.⁶⁵

Concerningly, the issue of Tommy John surgeries is not exclusive to Major League Baseball. In fact, teenagers have become the population that has the highest incidence of these surgeries. Specifically, adolescents between the ages of fifteen and nineteen account for approximately 57% of all Tommy John surgeries that occur in the United States.⁶⁶ This means that teenagers whose arms, muscles, and growth plates are not fully developed receive over half of the nation's Tommy John surgeries.⁶⁷ While the concern for UCL tears at the Major League level is warranted, there needs to be more discourse about the injury at the youth and Little League levels. As the emphasis on pitching velocity is only going to keep increasing, it is vital for the future of young athletes, and for baseball in general, to focus on the health ramifications for younger athletes.

Little League's Response and Recommendations to Improve Player Health

These concerns have generated some response at the youth level. For example, Little League Baseball implemented a pitch count quota. These rules set standards for the number of pitches to be thrown per day by age group, and sets a required number of rest days based on how many pitches were thrown.⁶⁸ While these rules certainly work to limit the strain placed on young pitchers' arms, critics of the pitch count rules argue that they do not do enough to prevent injuries. Former Penn State head baseball coach Rob Cooper explained in a 2017 interview that while he used to be in favor of the pitch count rules, he now feels that they are arbitrary and ineffective.⁶⁹ Cooper explained that "If a guy throws 101 pitches, all of a sudden, we think he's throwing a lot. If he throws 99, he had a good pitch count."⁷⁰ Instead, Cooper suggests that leagues track the number of pitches per week, or number of total throws.⁷¹

Another concern with the pitch count rule is that it does not accurately track how many pitches are actually thrown. As the focus on travel teams and year-round sports commitment only increases, many pitchers are playing on travel teams outside of the Little League organization.⁷² These leagues, like AAU baseball, have varying rules regarding pitch counts, with some leaving it up to the coaches and staff to do what is best regarding pitcher safety.⁷³ While the Little League pitch count rules will track the number of pitches in a Little League sanctioned game, there is no accounting of what pitchers are throwing in other leagues or at practice.⁷⁴

If a pitch count is not enough what else can be done? Big picture changes could include encouraging young athletes to play different sports throughout the year. Besides allowing kids to have a more well-rounded athletic experience, doctors also say that playing multiple sports is healthier for growth plates and muscles.⁷⁵ It may also be beneficial to shift the focus to strikeouts rather than velocity, and emphasize good mechanics over pure speed.

More specifically, as Cooper mentioned, perhaps the focus should be placed on how many throws a pitcher throws in an entire week, not just in one game.⁷⁶ This count should include bullpen pitches, individual training, practice, and warm up to get a more accurate gauge of the strain being put on the arm.⁷⁷

Another option includes tracking the number of pitches being thrown above a certain velocity, again allowing a better measure of arm strain.⁷⁸ For years, Little League parents and coaches have both found an issue in the rise of radar guns that are at kids games, arguing that their presence has contributed to the rise in velocity at a youth level.⁷⁹ However, apps have been created that take advantage of the rising presence of radar guns and help players and coaches monitor velocity and overuse better. One app, called Track-A-Pitch, allows players or coaches to track pitches and velocity from games, the bullpen and practice, then offers customized rest

recommendations based on MLB's Pitch Smart guidelines.⁸⁰ A company called Re-Play athletics has created a similar app which tracks pitches, shares the information with players, coaches, and parents, and sets reminders for when a player has hit their maximum number of pitches.⁸¹

Limiting pitch counts based on age and time of season has been a significant start for Little League Baseball in addressing the rising number of pitching injuries.⁸² Yet these rules have not been significantly updated since their implementation in 2006.⁸³ It is time for Little League to take advantage of these new apps and update these pitching rules, taking velocity into account more, to better protect youth pitchers' arms. Exhibit A illustrates a framework for potential velocity-based guidelines for Little League baseball.

Conclusion

The full implementation of the pitch clock for the 2023 Major League Baseball season has led to a vigorous debate over the effects it has on arm and shoulder injuries. While the actual effects of the pitch clock remain to be seen, what it has highlighted is the massive shift that has occurred in baseball pitching over the last twenty years. In particular, an emphasis on increased velocity across all pitches while maintaining a similar workload has been pointed out as a likely reason for the increase in Tommy John surgeries. While the effects and rehab of a Tommy John surgery are significant, Major League pitchers have proven resilient after the surgery through maintaining their pre-surgery velocity while also not seeing dips in the amount of money they are making on future contracts.

Where the change in pitching has had the greatest costs however is at the youth levels. Youth pitching has seen a similar emphasis on increasing velocity and getting strikeouts, just like the majors. These increases have also been paired with other concerning trends at the youth level, particularly overuse. While youth baseball groups have begun to address these issues with pitch

counts and rest days, youth pitchers still remain the largest group receiving significant surgeries such as Tommy John surgery. While the pitch counts are a good starting point, more can be done to address the issue, including tracking practice pitches in addition to in-game pitches, limiting the amount of participation a child can have throughout the year, and having guardrails in place that still take into account the number of pitches thrown, but also factor in the velocity at which a child is throwing these pitches to better determine the amount of rest that they need.

Exhibit A

Age 14 Under and a Velocity Band of 50-59mph

Pitch Count	Days Rest
-------------	-----------

1-15	0
16-35	1
36-50	2
51-65	3
66+	4

Age 14 Under and a Velocity Band of 60-69mph

Pitch Count	Days Rest
1-15	1
16-35	2
36-50	3
51-65	4
66+	5

Age 14 Under and a Velocity Band of 70+mph

Pitch Count	Days Rest
1-15	2
16-35	3
36-50	4
51-65	5
66+	6

Notes

¹ Josh Jackson, *Triple-A, Double-A to Implement Pitch Clock*, MLB.com (Jan. 15, 2015), <https://www.milb.com/news/gcs-106476386>. The first use of the pitch clock was during the 2014 Arizona Fall League, but this represented more of a “test” period for the MLB. The first true, full-time implementation was in 2015 in the two highest levels of minor league baseball where a violation of the 20-second clock would result in an automatic ball for the batter.

² *Pitch Timer (2023 Rule Change)*, MLB Rulebook Glossary, <https://www.mlb.com/glossary/rules/pitch-timer>. This includes a 30-second timer in between batters along with a timer of 15 seconds between pitches with no one on base, and 20 seconds with runners on base. The timer was reduced to 18 seconds with runners on base starting with the 2024 season.

³ Peter Chawaga, *Changes in MLB Pace of Play Fueling Increasing Attendance*, FORBES (Jun. 19, 2024, 9:10am) <https://www.forbes.com/sites/peterchawaga/2024/06/19/changes-in-mlb-pace-of-play-fueling-increasing-attendance/>.

⁴ *Id.* As compared to the 2022 season, Major League Baseball saw an increase of 9.6% for the entire 2023 season. Through the first week of June 2024, the number had increased 2% as compared to June 2023.

⁵ Baseball Doesn't Exist (@BaseballDoesnt), TWITTER (Apr. 8, 2024, 2:34 PM) <https://x.com/BaseballDoesnt/status/1777404706941276437>.

⁶ Steve Berman & Evan Drellich, *MLB Fires Back After MLBPA's Calls Pitch Clock a "Threat" as Pitching Injuries Mount*, THE ATHLETIC (Apr. 6, 2024), <https://www.nytimes.com/athletic/5396486/2024/04/06/mlbpa-pitch-clock-injuries/>. Following elbow injuries to star pitchers Shane Bieber and Spencer Strider, MLBPA executive director Tony Clark released a statement, which included “Despite unanimous player opposition and significant concerns regarding health and safety, the commissioner’s office reduced the length of the pitch clock last December...the league’s unwillingness thus far to acknowledge or study the effects of these profound changes is an unprecedented threat to our game and its most valuable asset—the players.” In response, the MLB released a statement that started, “This statement ignores the empirical evidence and much more significant long-term trends, over multiple decades, of velocity and spin increases that are highly correlated with arm injuries.”

⁷ Sportrac, *2023 MLB Salary Rankings*, https://www.sportrac.com/mlb/rankings/player/_/year/2023/sort/cap_total.

⁸ The average of the top 10 starting pitcher salaries in 2011 was \$18,466,071. Meanwhile the average of the top 10 infielder and outfielder salaries were \$19,891,071 and \$18,539,107 respectively.

⁹ In 2024 the average of the top 10 starting pitcher salaries is \$33,363,810, compared to the infield average of \$32,286,140 and outfield average of \$28,828,333.

¹⁰ This includes access and availability to effective rehab, effects on maintaining velocity, and receiving additional Major League contracts. All of this will be discussed further in this paper.

¹¹ Bill Ladson, *50 Years Ago, Tommy John Changed Baseball History*, MLB.COM (Mar. 22, 2024), <https://www.mlb.com/news/tommy-john-surgery-50th-anniversary#:~:text=The%20procedure%20was%20performed%20on,held%20in%20place%20by%20anc> hors.

¹² Dr. Ben Zellner, *A History and Overview of Tommy John Surgery*, OSMS, <https://osmsgb.com/ortho/a-history-and-overview-of-tommy-john-surgery/>. While typically associated with baseball pitchers, a torn UCL is common for just about any athlete, particularly those who are subject to repetitive throwing motions such as a quarterback in football, volleyball players, softball, or even javelin throwers. Even a twisting motion, usually found in sports like wrestling, cheerleading, or gymnastics, can lead to UCL damage and Tommy John surgery.

¹³ Johns Hopkins Medicine, *Tommy John Surgery (Ulnar Collateral Ligament Reconstruction)*, <https://www.hopkinsmedicine.org/health/treatment-tests-and-therapies/tommy-john-surgery-ulnar-collateral-ligament-reconstruction>. The tendon is usually taken from the palmaris longus tendon in the upper forearm, the hamstring tendon, or the big toe extensor tendon.

¹⁴ Kerlan-Jobe Institute, *Marking 50 Years of Tommy John Surgery*, <https://kerlanjobe.org/50-years-tommy-john-surgery/>.

¹⁵ Dr. Ben Zellner, *supra* note 12. John's career had started in Cleveland in 1963 and he was having an impressive 1974 season, going 13-3 in his starts prior to surgery. John returned to the Dodgers in 1976 and won 164 more games for the Dodgers, Yankees, Angels, and A's. John was also an All-Star selection from 1978-1980.

¹⁶ Kerlan-Jobe Institute, *supra* note 14; Cleveland Clinic, *Tommy John Surgery*, <https://my.clevelandclinic.org/health/treatments/25117-tommy-john-surgery>.

¹⁷ *Id.* In some cases, return rates were seen as high as 95%.

¹⁸ See *supra* Note 6.

¹⁹ Joe Lemire, *As MLB Pitch Clock Seems Imminent, Tech and Data Can Help Prevent the Possible Downside: Pitcher Fatigue*, SPORTS BUSINESS JOURNAL (May 18, 2022), <https://www.sportsbusinessjournal.com/Daily/Issues/2022/05/18/Technology/an-mlb-pitch-clock-is-imminent-and-maybe-only-tech-and-data-can-prevent-the-downside-pitcher-fatigue.aspx>. Sonne would go on to compare the pitch clock to going to the gym and shortening the time between reps saying that "it's a lot more tiring by the end [of the shortened time period]."

²⁰ *Id.*

²¹ *Id.* The study used three different time intervals for the pitchers; the twenty second clock, a twelve second clock, and an eight second clock over a seven inning period.

²² Same 5/18/2022 SBJ article. The notable muscle inflammation was primarily found after the twelve-second pitch clock outing. The study concluded that the eight-second pace was not feasible for a pitcher.

²³ Troy Puga et. al., *The Major League Baseball Pitch Clock: First Year Analysis of Pitcher Injuries*, 57 Journal of Orthopedics 133, 133 (2024).

²⁴ *Id.*

²⁵ *Id.*

²⁶ *Id.* at 134.

²⁷ Tom Verducci, *MLB Pitchers Are Only Getting Tougher to Hit*, SPORTS ILLUSTRATED (Nov. 13, 2023), <https://www.si.com/mlb/2023/11/13/2023-mlb-pitching-trends-pitchers-getting-tougher-to-hit>. From 2015 through 2023, the percentage of fastballs thrown in the MLB went from about fifty-seven percent to forty-seven percent.

²⁸ J.J. Cooper, *Ever-Climbing Velocity Pushes Hitters to the Brink*, BASEBALL AMERICA (Sept. 23, 2023), <https://www.baseballamerica.com/stories/cooper-ever-climbing-velocity-pushes-hitters-to-the-brink/>.

²⁹ *Id.*

³⁰ *Id.*

³¹ Verducci, *supra* note 26. The Statcast Era began in 2015 allowing for greater tracking of various statistics across the MLB.

³² PitchLogic, *Slider 101: Everything You Need to Know to Master the Pitch*, PitchLogic, <https://pitchlogic.com/blogs/slider-101-everything-you-need-to-know-to-master-the-pitch>; MLB Pitch Smart Rules for Ages 9-12 pitching, <https://www.mlb.com/pitch-smart/pitching-guidelines/ages-9-12>. The grip of a traditional slider is identical to that of a fastball, however, the arm motion involves a violent, downward motion that creates the sliding effect. The violence of the motion has led many groups, including the MLB, to recommend, or all-out ban the use of the pitch until a person reaches high school age.

³³ Cooper, *supra* note 27.

³⁴ *Id.* During this period, the average slider velocity did fall three times from the previous year (2012, 2017, and 2020). The average fastball velocity during this time increased in some capacity every year.

³⁵ Andy McCullough, *Missing Bats: How an obsession with strikeouts upended the balance of baseball*, THE ATHLETIC, Jun. 24, 2024.

³⁶ *Id.*

³⁷ *Id.*; Verducci, *supra* note 26. The article provides various examples of pitchers, including Colin McHugh, Tyler Glasnow, and Lance McCullers, who were able to reinvent their careers after their team's pitching coaches emphasized their breaking pitches and their velocity more. The article also provides a chart that shows the general rise of velocity for breaking pitches with sinkers topping out at 93 mph and sliders just under 85 mph by 2024. After providing an example of his "perfect inning," Glasnow was

quoted as saying “I don’t think I’ll ever pitch to contact.” Verducci highlights the location aspect of this change, noting the strong upward trend of elevated cutters and breaking pitches starting in 2015 through the 2023 season.

³⁸ Pro Baseball Reference Page of Year-by-Year pitching, <https://www.baseball-reference.com/leagues/majors/pitch.shtml>.

³⁹ *Id.* This number topped out at 8.81 during the 2019 MLB season.

⁴⁰ Tommy John Surgery, MLB (last visited Nov. 17, 2024), <https://www.mlb.com/glossary/injuries/tommy-john-surgery>.

⁴¹ Christopher Ahmed, *Question — Will My Velocity Go Up after Tommy John Surgery?*, MEDIUM, Jun. 29, 2022.

⁴² *Id.*

⁴³ *Id.*

⁴⁴ Marc Topkin, *2 Years Later, Shane Baz set to Return to Rays, Show What He Can Do*, YAHOO SPORTS (Jul. 5, 2024) <https://sports.yahoo.com/2-years-later-shane-baz-022200699.html?>.

⁴⁵ Baseball Savant, *Shane Baz*, <https://baseballsavant.mlb.com/savant-player/shane-baz-669358?stats=statcast-r-pitching-mlb>.

⁴⁶ *Id.*

⁴⁷ Baseball Savant, *Walker Buehler*, <https://baseballsavant.mlb.com/savant-player/walker-buehler-621111?stats=statcast-r-pitching-mlb>. Buehler was in the 77th percentile in 2021, and the 65th percentile in 2024.

⁴⁸ To provide another example, Minnesota Twins starter Chris Paddack, who has had two Tommy John surgeries, saw his velocity before his second surgery (94.8mph) dip only slightly upon return (93.3mph).

⁴⁹ *2024 MLB Salary Rankings*, Spotrac, https://www.spotrac.com/mlb/rankings/player/_/year/2024/position/sp/sort/cap_base.

⁵⁰ *Id.*

⁵¹ *Shohei Ohtani's \$700M deal shows trust in new brand of Tommy John surgery*, FOX SPORTS (Mar. 14, 2024) <https://www.foxsports.com/stories/mlb/shohei-ohtani-700m-deal-shows-trust-in-new-brand-of-tommy-john-surgery>.

⁵² *Id.*

⁵³ *Historical Information*, Little League (last visited Nov. 18, 2024).

⁵⁴ International Journal of Sports Physical Therapy, 5/9/2014.

⁵⁵ Little League World Series Pitch Count, Dan Treacy, 8/22/2024. No average velocity stats were provided for the 2023 or 2024 version of the Little League World Series.

⁵⁶ There is no available breakdown that compares how many fastballs a Little League pitcher throws as compared to how many breaking pitches they throw during a tournament. Matt Martell, *Little League Pitching is Awesome, but What are the Implications?*, PENN LIVE PATRIOT NEWS (Dec. 17, 2024) https://www.pennlive.com/sports/2017/12/little_league_pitching_is_awesome.html.

⁵⁷ When discussing his star pitcher, Ethan Rider, in 2017, Connecticut manager Mike Randazzo complimented his ability to have a breaking pitch that attributed to his dominance at that year’s Little League World Series. *Id.*

⁵⁸ *Id.*

⁵⁹ Little League Baseball, *Youth Baseball Pitching Study Shows Overuse is Primary Cause of Arm Injuries*, Little League Baseball, <https://www.littleleague.org/partnerships/pitch-smart/overuse-primary-cause-arm-injuries/>. The five-year study was conducted with the University of North Carolina’s Department of Exercise and Sports Science. Stephen Keener, President and CEO for Little League Baseball and Softball, highlighted the inconclusive results of the study saying “a ban on breaking balls would not be simple to put into practice. With such a wide range of aptitude and ability, it’s practically impossible to judge if any youth pitcher intended to throw a curveball...”

⁶⁰ Trent M. Tamate & Alexander C. Garber, *Curveballs in Youth Pitchers: A Review of the Current Literature*, Hawaii J. Health Soc. Welf., (2019), <https://pmc.ncbi.nlm.nih.gov/articles/PMC6874692/>; Shouchen Du et. al., *A Biomechanical Comparison of Youth Baseball Pitches: Is the Curveball Potentially Harmful?*, Am. J. Sports Med. (Apr. 2008), <https://pmc.ncbi.nlm.nih.gov/articles/PMC6874692/>. Both these articles produced results that determined that elbow varus torque, shoulder internal rotation torque, elbow proximal force, and shoulder proximal force were greatest when youth pitchers threw a fastball, with the

curveball second. Altogether, these findings concluded that the supination motion of a curveball (where the arm turns resulting in a palm-up finish) did not increase the risk of an UCL injury.

⁶¹ Little League Baseball, *supra* note 57. When asked about the ability for Little League to completely outlaw breaking pitches, President and CEO of Little League Baseball and Softball Stephen Keener admitted “[E]ven 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.”

⁶² Little League University, *The Number-One Risk of Arm Injuries Continues to be Year-Round Play*, LITTLE LEAGUE BASEBALL, <https://www.littleleague.org/university/articles/the-number-one-risk-of-arm-injuries-continues-to-be-year-round-play/>.

⁶³ Little League Baseball, *supra* note 57.

⁶⁴ Lurie Children’s Hospital, *Injury Prevention for Pitchers*, <https://www.luriechildrens.org/en/specialties-conditions/pediatric-sports-medicine/sports-injury-prevention-tips/injury-prevention-for-pitchers/#:~:text=Overuse%20injuries%20are%20by%20far,of%20maximum%20effort%20pitches%20thr own.>

⁶⁵ *Id.* Little League Baseball, *supra* note 60.

⁶⁶ Jeffrey May, *Kids Needing Tommy John Surgery Exposes the Failings in Our Youth Baseball Culture*, AS (Apr. 10, 2024, 1:21pm), <https://en.as.com/mlb/kids-needing-tommy-john-surgery-exposes-the-failings-in-our-youth-baseball-culture-n-2/>.

⁶⁷ *Id.*

⁶⁸ Little League University, *Regular Season Pitching Rules*, <https://www.littleleague.org/playing-rules/pitch-count/>.

⁶⁹ Martell, *supra* note 54.

⁷⁰ *Id.*

⁷¹ *Id.*

⁷² Hospital for Special Surgery, *Intensive Participation in a Single Sport: Is it Good or Bad for Kids?*, [https://www.hss.edu/article_should-kids-play-competitive-sports.asp#:~:text=In%20fact%2C%20of%20the%2060,round%2C%20often%20on%20multiple%20team s. Research shows that approximately 27% of the 60 million American children that play youth sports, have chosen to specialize in one sport. Neeru Jayanthi et. al., Sports Specialization in Young Athletes, Sports Health, \(May 2013\). Another study mentions that 77.7% of high school athletic directors have noticed an increase in one sport specialization.](https://www.hss.edu/article_should-kids-play-competitive-sports.asp#:~:text=In%20fact%2C%20of%20the%2060,round%2C%20often%20on%20multiple%20team s. Research shows that approximately 27% of the 60 million American children that play youth sports, have chosen to specialize in one sport. Neeru Jayanthi et. al., Sports Specialization in Young Athletes, Sports Health, (May 2013). Another study mentions that 77.7% of high school athletic directors have noticed an increase in one sport specialization.)

⁷³ New England AAU Baseball Rules, https://www.neaabaseball.org/layout_container/show_layout_tab?layout_container_id=28814387&page_node_id=2942567&tab_element_id=96512#:~:text=There%20are%20NO%20Pitching%20rules,be%20re moved%20during%20the%20game. These rules emphasize that there are “NO pitching rules for league play” and that the league encourages and trusts the coaches “will make their player’s health is their first priority.”

⁷⁴ Martell, *supra* note 54.

⁷⁵ LiveHealthy, *Raising an Athlete? The Benefits of Exposing Your Kid to Multiple Sports*, LIVEHEALTHY (July 25, 2023), <https://livehealthy.muhealth.org/stories/raising-athlete-benefits-exposing-your-kid-multiple-sports.>

⁷⁶ Martell, *supra* note 54.

⁷⁷ *Id.*

⁷⁸ See *infra* Exhibit A. This suggested chart provides an example of what these guidelines could look like. The chart used is based primarily around the Age 14 pitching guidelines provided by Little League Baseball.

⁷⁹ John LaRue, *New Pitch Smart Pitch Count Guidelines to Protect Youth Arms*, ELITE BASEBALL PERFORMANCE, <https://elitebaseballperformance.com/new-pitch-smart-pitch-count-guidelines-to-protect-youth-arms/#:~:text=In%20today's%20baseball%20game%2C%20the,risk%20factors%20for%20becoming%20 hurt.>

⁸⁰ <https://www.trackapitchapp.com/>

⁸¹ Martell, *supra* note 54.

⁸² Little League University, *supra* note 64.

⁸³ Little League University, *Pitch Smart Program*, <https://www.littleleague.org/partnerships/pitch-smart/#:~:text=After%20several%20years%20of%20research,since%20establishing%20strict%20pitching%20rules.>