

Temporal Trends in Lower Extremity Injuries in NBA Athletes: A 30-Year Epidemiological Study

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INTRODUCTION: Professional basketball demands frequent high-intensity actions including sprinting, cutting, jumping, and decelerating, placing substantial strain on the lower extremity. Over the past three decades, the National Basketball Association (NBA) has undergone multiple structural and stylistic transitions, including rule modifications, tactical shifts, and scheduling changes, that may have amplified these physical demands. Notably, the elimination of hand-checking, the onset of the pace-and-space era, and pandemic-related scheduling disruption may have influenced injury trends. This study investigates how these gameplay evolutions correspond to changes in the incidence of Achilles, hamstring, and calf injuries among NBA players.

METHODS: A retrospective review of publicly available NBA injury data was conducted using reports from ProSportTransactions.com, spanning the 1995–2024 seasons. Each injury was categorized by anatomic region. Muscle-tendon injuries to the Achilles tendon, hamstring, and calf were isolated for primary analysis. Seasons were grouped into four gameplay eras: before and after the implementation of the hand-checking rule (pre-handcheck (1995–2003), post-handcheck (2004–2010)), after the shift in gameplay pattern to perimeter play (pace-and-space (2011–2019)), and post-COVID (2020–2024). Poisson regression models were employed to evaluate changes in annual injury incidence for each structure across gameplay eras.

RESULTS: Out of approximately 30,000 documented injuries, a total of 1,327 involved the Achilles tendon, hamstring, or calf. The incidence of Achilles tendon injuries increased significantly following the elimination of hand-checking (IRR = 1.51, 95% CI: 1.19–1.93, $p < 0.001$), suggesting a link between increased explosive isolation play and Achilles loading. During the pace-and-space era, hamstring injuries rose significantly (IRR = 1.28, 95% CI: 1.08–1.51, $p = 0.004$), as did calf injuries (IRR = 1.55, 95% CI: 1.21–1.99, $p < 0.001$), aligning with periods of greater sprint frequency and cutting maneuvers. These elevated injury rates persisted into the post-COVID era, where schedule compression and recovery limitations likely contributed to ongoing vulnerability. Temporal trends confirmed sustained increases across all three muscle-tendon groups in the modern game.

DISCUSSION AND CONCLUSION: This study identifies clear, statistically significant shifts in lower extremity muscle-tendon injury rates associated with strategic and structural changes in NBA play. Achilles, hamstring, and calf injuries increased substantially in eras marked by isolation-based offense and up-tempo transition play. These findings underscore the importance for orthopaedic sports medicine practitioners to contextualize injury risk not only by anatomy but also by evolving sport-specific dynamics. As NBA gameplay continues to prioritize speed and spacing, clinicians should emphasize eccentric strength training, workload monitoring, and individualized prevention protocols tailored to these movement patterns. By anticipating shifts in injury distribution, orthopaedic providers can optimize care delivery for elite athletes in a rapidly evolving competitive landscape.

Table 2. Achilles, Calf, and Hamstring Incidence Rate Ratios (IRRs) across National Basketball Association "Eras"

Region	Era	IRR	95% CI Lower	95% CI Upper	p-value
Achilles	Post Handcheck	1.514	1.186	1.932	<0.001
	"Pace & Space"	0.508	0.392	0.658	<0.001
	"Bubble" Season	1.276	0.52	3.132	0.595
	Post "Bubble"	1.11	0.429	2.876	0.829
Calf	Post Handcheck	0.905	0.695	1.18	0.463
	"Pace & Space"	1.551	1.21	1.988	<0.001
	"Bubble" Season	0.991	0.489	2.008	0.980
	Post "Bubble"	1.091	0.513	2.317	0.821
Hamstring	Post Handcheck	1.203	0.986	1.467	0.068
	"Pace & Space"	1.194	0.994	1.433	0.058
	"Bubble" Season	1.12	0.656	1.913	0.677
	Post "Bubble"	0.708	0.392	1.281	0.254

IRR, Incidence Rate Ratios; CI, Confidence Interval

Figure 1: Lower Extremity Injuries (1995-Present)

