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Abstract

This paper investigates the influence of early-career environments on long-run performance. Utilizing quasi-randomness of the NBA Draft Lottery system, we isolate the impacts of initial team success, coaching experience, and the presence of a star player during a basketball player's debut season. Our findings underscore the significant positive effects of early team wins and experienced coaches on future player performance. Surprisingly, playing alongside a star player in the first year does not show a strong influence. This study offers insights that extend beyond sports, emphasizing the lasting effects of early professional experience and mentorship on career trajectories.

Keywords: early-career success, NBA draft lottery, long-term performance, mentorship

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1 Introduction

The initial stages of a professional career are crucial in shaping long-term income, job satisfaction, and productivity. This formative period is influenced by a myriad of factors, including the work culture, the quality of mentorship and leadership, and the opportunities available for skill and personal development. In this complex landscape, individual performance is not merely a reflection of innate talent or skill but is also significantly shaped by these external factors. In particular, a more nurturing environment around an individual can boost professional growth (e.g., Kahn [2010]; Oreopoulos et al. [2012]). Furthermore, the presence of a team leader can also profoundly influence an individual's development (e.g., Allen et al. [2004]; Kram [1985]). A good mentor provides guidance and knowledge, sets a standard of excellence, and fosters an environment conducive to growth. Similarly, the characteristics of one's peers within a team or organization can have a significant impact (e.g., Sacerdote [2001]; Zimmerman [2003]). Working alongside skilled and motivated colleagues can inspire and challenge an individual, enhancing learning and performance. This study explores how these early-career environmental attributes, including team success, quality of leadership, and peer influence, shape an individual's long-term performance.

We investigate the influence of three key factors that National Basketball Association (NBA) players encounter in their first season and how these factors affect their long-term performance in the league. Our analysis is supported by a rich and detailed dataset, unique in its consistent and objective performance metrics measured across each player's entire career. This level of data detail is rarely achievable in related literature due to the lack of granularity and consistently-measured productivity metrics over the long term. Using data from the NBA, we examine the impact of the number of team wins in a player's first season, the career wins accumulated by their head coach before the player's first season, and the presence of a 'star' player on the team. Our study exploits a natural experiment provided by the NBA draft lottery system, allowing us to isolate the effects of this early experience on long-term player performance. This approach enables us to understand how the early-career

professional environment shapes players' future trajectory and success in the NBA.

We apply an instrumental variable (IV) strategy to identify the effects of these three key variables distinctly. Our approach centers on exploiting the inherent randomness of the NBA draft lottery system, which impacts the allocation of new players to diverse initial environments. The expected draft order is usually determined by the reverse order of team standings from the previous season, meaning the team with the worst record is expected to pick first [1]. However, this order may vary due to the lottery and other factors like pick transfers. As a result, successful teams might occasionally secure top picks and choose the most promising players, while struggling teams might end up with lower picks. Our instrumental variable is the difference between a team's expected and actual draft order which is purely determined by the team's "luckiness" in the lottery. This method allows us to effectively isolate and examine the influence of each variable on a player's long-term performance in the league.

First, our research focuses on the influence of early-career team success on long-term individual performance. While existing studies primarily emphasize immediate outcomes, such as initial earnings or job placement rates (e.g., Audia et al. [2000]; Bol et al. [2017]), our approach extends to examining the impact on performance and career trajectory over a more extended period. Additionally, much of the current literature concentrates on how individual achievements affect future performance, often overlooking the role of a team's success and the overall organizational culture. Our findings indicate that the number of wins a player's team secures in his first season significantly enhances his performance five years later.

Second, our study explores the impact of coaching and mentorship on an individual's long-term performance. While numerous studies have delved into the influence of mentorship (e.g., Olivero [1997]; Serrat [2017]), they primarily focus on subjective outcomes such as

[1] A "pick" is a team's right to select a player during the draft. Picks are numbered (e.g., first pick, second pick, third pick, etc.), and the team with the first pick has the right to choose any eligible player first, followed by the team with the second pick, and so on.

job satisfaction or wages, often bypassing the direct impact on performance. This oversight partly stems from the challenges in consistently measuring performance over an extended period in real-world settings. Furthermore, existing research treats mentorship homogeneously, without distinguishing between varying mentor experience levels or success.

We exploit a precise, quantifiable measure of coach success, namely the number of NBA wins accumulated before the player's debut season. This approach allows us to differentiate between coaches based on their track records. Our findings indicate that having a coach with more accumulated wins early in player's career translates into significant and enduring improvements in a player's performance metrics. This highlights the critical role successful coaching plays in shaping long-term career trajectory.

Third, our study examines the impact of playing alongside a high-performing peer — specifically, whether a rookie's team included a player ranked in the top 15 in the previous season — on a rookie's long-term performance.[2] Contrary to the commonly observed positive effects of peer influence (e.g., Bandiera et al. [2010]; Mas & Moretti [2009]), we find no significant difference in the long-term performance of players who played their first season with a 'star' player compared to those who did not. This could be attributed to factors such as the critical role of teamwork in basketball, competitive dynamics among players, or the limited influence of just one year of exposure to a top player. We explain this more thoroughly in the Results section.

1.1 Literature Review

A considerable body of the literature exists on the determinants of long-term career success, often focusing on factors including education, skills, and social networks. However, the fewer studies have examined influence of the early-career environment on long-term professional outcomes. Research in labor economics studies how initial job placements, mentorship, and

[2]In this context, a "top-15 player" refers to a player who was included in the "All-NBA" first, second, or third team in the previous season. The "All-NBA Team" is an annual NBA honor awarded to the best players in the league following every NBA season. The voting is conducted by a panel of sportswriters and broadcasters throughout the United States and Canada.

the quality of first jobs impact future earnings and job satisfaction (e.g., Oreopoulos et al. [2012]; Kahn [2010]). Nevertheless, existing studies primarily concentrate on monetary outcomes, neglecting the long-term impact on performance.

Another strand of literature investigates the psychological and performance-related impacts of individual success or "winning" early in one's career, and the results are mixed. Some studies show that winning early increases motivation and promotes risk-taking, which may reinforce future success (e.g., Audia et al. [2000]; Bandura [1977]; Bol et al. [2017]). On the other hand, some research suggests that early success may also lead to complacency or overconfidence (Isidore & Christie [2019]; Priya & Seema [2018]), which could have detrimental effects on future performance (e.g., Malmendier & Tate [2005]; Camerer & Lovallo [1999]). While these studies offer insights into the impact of individual successes, they often do not account for the surrounding team or organizational culture in which these wins occur.

Peer effects have been extensively studied across various domains, from education to workplace settings. For example, studies within academic environments have shown that high-achieving peers can elevate an individual's performance (e.g., Sacerdote [2001]; Zimmerman [2003]). In professional contexts, the presence of high-performing colleagues or mentors can lead to improved learning, motivation, and performance overall (e.g., Bandiera et al. [2010]; Mas & Moretti [2009]).

The next area of interest in our study - mentorship - also receives plenty of attention in the literature, which shows various positive impacts. These range from improved job performance, career satisfaction, and commitment to the organization to enhanced professional identity and expanded networks (e.g., Allen et al. [2004]; Kram [1985]; Olivero [1997]; Serrat [2017]; Shang [2022]). However, many of these studies rely on self-reported benefits, potentially introducing bias.

A handful of studies in sports economics have ventured into understanding career longevity and performance metrics (e.g., Berri & Krautmann [2006]; Leeds & von Allmen [2014]). These investigations often focus on factors including player skills, injuries, and contracts but

tend to overlook the influence of team environment, particularly in the crucial early years of a player's career. However, the impact of early team success has received limited attention.

The remainder of this paper is organized as follows: In Section 2, we provide background information on the NBA and its draft lottery system, emphasizing its utility as a natural experiment for our study. Section 3 describes the dataset sourced from Basketball-Reference.com, elaborating on the variables and performance metrics under consideration. Our identification strategy, which hinges on the quasi-random variation introduced by the NBA Draft Lottery system, is articulated in Section 4. We present our core findings in Section 5, diving into the impact of early team wins, the significant role of coaches, and the nuanced influence of playing alongside a star player during the initial season. Lastly, Section 6 concludes the paper, synthesizing our findings and drawing broader implications for the sports industry and the general labor market.

2 Background

We exploit the setting of the National Basketball Association (NBA) to test our hypothesis. The NBA - the world's leading basketball league with a long history - consists of 30 teams from the USA and Canada. It employs a particularly interesting system of allocating new players accross teams, namely the draft lottery. The system includes randomness in the process, which is beneficial for identifying causal relationships.

The draft lottery mechanism involves a randomizer - a ping-pong ball machine. The balls are drawn to create a unique combination of numbers. Teams are assigned a set of these combinations based on their records from the previous season. The worse a team's record, the more combinations it can receive. For instance, the team with the worst position in the table might have a 14% chance of their combination being drawn first, while a better-performing team might have a 12.5% chance. This equalizes the teams to smooth out the previous season's results and effectively introduces progressive taxation.

Historically, this system has led to surprising outcomes. Interestingly, in the 2019 NBA Draft, the New Orleans Pelicans secured the top pick despite having only a 6% chance, eventually selecting Zion Williamson, one of the best prospects of the last decade. On the other hand, teams with the worst records have sometimes ended up with lower picks, adding a quasi-random element to allocating young talent across varying team environments.

The introduced randomness is crucial to our identification strategy. By serving as an exogenous source of variation in which players start their careers, this randomness allows us to isolate the impact of early-career environments on long-term performance. In essence, the draft lottery system offers a natural experiment to study how varying levels of early-career success—often reflected in team wins during a player's first season—affect long-term career outcomes.

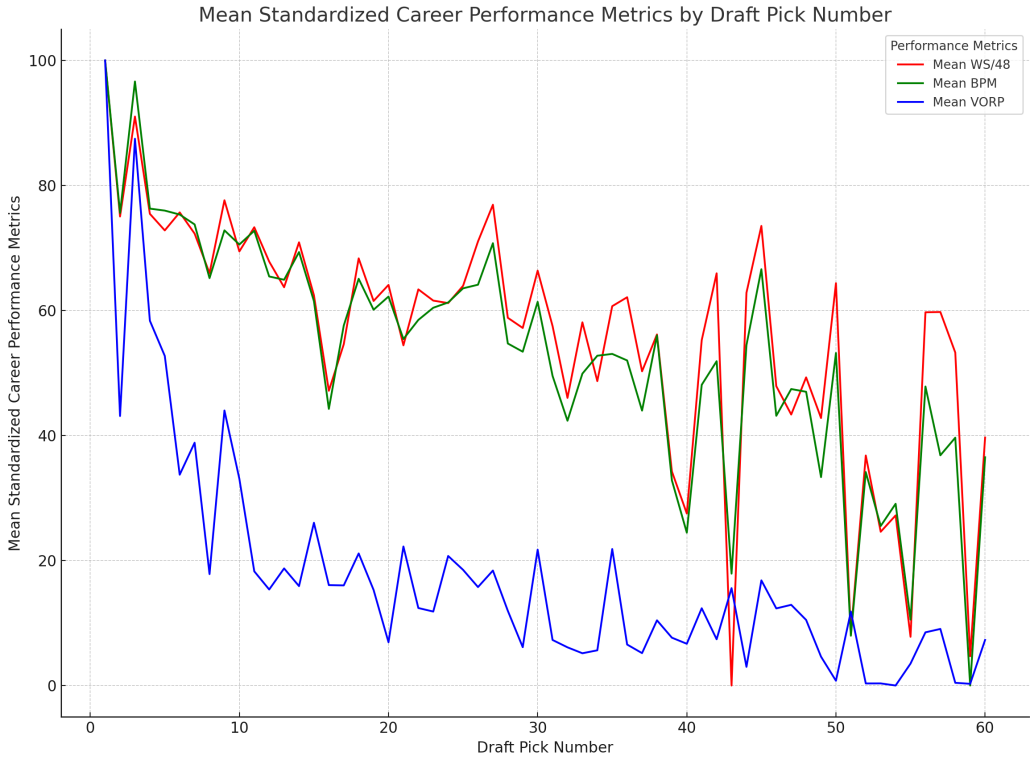
It is important to note that NBA teams generally possess an excellent ability to evaluate future talent, particularly for top draft picks (see Figure 1). For instance, there was a consensus in the 2019 NBA Draft that Zion Williamson would be the first player selected, regardless of which team secured the first pick. This suggests that a known or assumed ranking of new players within the NBA is often based on their projected future performance. This ability to effectively rank players, especially at the top of the draft, gives further credibility to our identification strategy. It allows us to control for individual talent levels while focusing on the quasi-randomness introduced by the draft lottery system.

3 Data

We utilize data from Basketball-Reference.com, which gathers a rich set of statistics starting from early NBA years. We analyze the 2000 to 2022 time-span of data containing draft information, and player and team characteristics for each season.

We collect individual statistics for the above mentioned period including the number of points, assists, rebounds, as well as advanced metrics including Box Plus/Minus (BPM), Win

Figure 1: Players' Performance by Draft Pick



Notes: WS/48: Win Shares per 48 minutes is a performance measure that estimates the number of wins a player contributes per 48 minutes. Higher values signify greater contributions to team success. BPM: Box Plus/Minus is a box score-based metric that measures a player's contribution to a team when that player is on the court, compared to an average player. Positive values indicate above-average contributions, while negative values indicate below-average contributions. VORP: Value Over Replacement Player calculates the points a player contributes over a replacement-level player per 100 team possessions. It serves as an estimate of the player's overall contribution to team wins. All metrics are standardized to have a minimum value of 0 and a maximum value of 100 to facilitate easier comparison between different metrics. Draft Pick Number represents the sequential order in which players are drafted. Lower numbers indicate earlier draft picks, often signifying higher expectations for performance.
Source: Authors' calculation based on basketball-reference.com

Shares per 48 minutes (WS/48), and Value Over Replacement Player (VORP). Considering multiple player performance metrics allows us to build a wider picture of the impact of early career success on individual performance.

The draft data includes information on the sequential order ("pick number") in which players were selected during the NBA Draft. This variable is central to our study as it indicates initial expectations surrounding a player's potential.

We also use team-level statistics to evaluate the team environment in which players start their careers. These statistics include season-by-season performance measures, including win-loss records, which help us to identify the 'winning culture' in which a player is initially embedded.

Table 1: Summary Statistics

Variable	N	Mean	Std Dev	Min	25%	Median	75%	Max
Average Win Shares	590	0.00	0.06	-1.17	0.00	0.00	0.02	0.33
Player Efficiency Rating	599	13.18	4.52	-14.65	10.62	12.94	15.69	27.39
True Shooting Percentage	599	0.52	0.06	0.00	0.49	0.53	0.55	0.72
Value Over Replacement Player	590	0.14	0.34	-0.90	-0.01	0.06	0.20	3.30
Number of Seasons	599	6.16	2.66	1.00	4.00	6.00	9.00	9.00
Wins Before Draft	599	37.35	12.28	7.00	28.00	38.00	47.00	67.00
Draft Pick Number	599	14.93	8.32	1.00	8.00	15.00	22.00	29.00
First Season Wins	553	37.40	12.09	7.00	27.00	37.00	47.00	67.00
Draft Luck	599	-1.43	6.69	-27.00	-2.00	0.00	1.00	25.00

Notes: This table outlines summary statistics for key variables used in the regressions. "Average Win Shares" quantifies the player's contribution to team wins. "Player Efficiency Rating" is a measure of a player's per-minute productivity. "True Shooting Percentage" accounts for field goals, 3-point field goals, and free throws. "Value Over Replacement Player" measures the value a player adds over a replacement-level player. "Number of Seasons" indicates the player's career length. "Wins Before Draft" shows the drafting team's wins in the prior season. "Draft Pick Number" indicates the order in which the player was drafted. "First Season Wins" is the number of team wins in the player's first season. "Draft Luck" quantifies the deviation from the expected draft pick based on team performance.
Source: Authors' calculation based on basketball-reference.com

Our study focuses on four individual performance metrics, which we describe in detail below and support with exact formulas in the Appendix. Win Shares is a player statistic that allocates team performance across individual players participating in the game (Oliver,

2004). It is calculated using player, team, and league-wide statistics (see Appendix A.1 for calculations). The formula considers offensive win shares, defensive win shares, and marginal win shares. The metric is designed to isolate individual contributions and capture how many wins a player contributed to the collective success. The Player Efficiency Rating is a per-minute metric that sums up various player's positive metrics, subtracts the negative ones, and returns a one number result (Hollinger, 2005). Since it is a normalized metric, it captures the efficiency of players even if they do not receive a high number of minutes on the court, which is relevant for new players (see Appendix A.2 for calculations). True Shooting Percentage is a purely individual metric that relies the least on other players' performance. It includes all kind of shots (3-point, 2-point, and free throws) making it a more complete and meaningful depiction of shooting efficiency than field goal percentage. The formula is $\text{TS\%} = \frac{\text{PTS}}{2(\text{FGA}+0.44\times\text{FTA})}$. Again, this metric reflects an individual's efficiency rather than the team's performance. Value Over Replacement Player is a metric that estimates a player's contribution in comparisson to a "replacement-level" player, who is defined as a player on the minimum salary or not a regular starter. VORP is based on Box Plus/Minus (another advanced metric) and accounts for a player's minutes played (see Appendix A.3 for calculations). The higher the VORP, the more a player contributes to team wins, above that which a replacement player would provide. The metric can effectively distinguish individual performance from team success.

4 Identification Strategy

Our identification strategy seeks to discern the causal impacts of multiple factors on a player's long-term performance development: early team success (measured by wins in the first season), the accumulated experience of a player's coach (quantified by their previous career wins), and the influence of sharing the court with a star player during a player's first season.

Our instrument capitalizes on the quasi-random variation introduced by the NBA Draft

Lottery system. The instrument captures the difference between the expected draft order, based on team performance from the previous season, and the actual draft order post-lottery (see Table 2). Given the design of the draft lottery mechanism as a random process independent of player ability or future potential, this "luck" variable is exogenous. Moreover, it strongly correlates with first-season team wins, coach wins, and top player presence, making it a relevant instrument to isolate the causal effect of the early-career environment on future performance. Table 3 presents the first-stage results for all variables of interest. The instrument achieves a statistically significant level of 1% for each variable, indicating strong predictive power.

Table 2: Luck Variable Example

Team	Last Season Place	Exp. Draft Order	Actual Draft Order	Luck
Brooklyn Nets	30	1	3	-2
Orlando Magic	29	2	6	-4
Los Angeles Lakers	28	3	2	1
Boston Celtics	27	4	1	3

We define long-term performance as the average annual growth in key performance metrics (Win Shares, Player Efficiency Rating, True Shooting Percentage, and Value Over Replacement Player) over the first five years of an NBA player's career. These metrics are crucial as they reflect the evolution or decline of a player's skill set and overall impact in the league. This approach allows us to capture the enduring effects of his initial professional experience.

We acknowledge the potential 'reflection problem' in our analysis. This problem arises from the possibility that a new player's performance might influence the number of wins his team achieves in the first season, leading to a circular cause-and-effect relationship. It is important to note that rookies generally play a limited role in their teams, rendering their direct impact on team wins relatively minor. To further address this concern and avoid misinterpretation, our approach excludes the first season's performance from the dependent variables in models assessing the impact of first-season team wins. Focusing on the average

growth in performance metrics from the second to the fifth seasons effectively circumvents the reflection problem and ensures a more accurate long-term performance analysis.

To assess the relationship between these early-career factors and long-term performance, we employ a two-stage least squares (2SLS) regression model. In our models, the variable of interest, X, can represent early team wins, accumulated coach wins, or the presence of a star player in the debut season.

Stage 1:

$$X_i = \alpha + \gamma \cdot \text{luck}_i + \text{W}_i'\delta + \theta_{\text{team}} + \lambda_{\text{pick}} + \epsilon_i$$

Stage 2:

$$\text{Performance}_i = \beta \cdot \hat{X}_i + \text{Z}_i'\phi + \eta_{\text{team}} + \omega_{\text{pick}} + \mu_i$$

Here, the variable of interest, X, can represent the number of wins a player experienced with the team in his first season, the number of wins in the NBA a player's head coach accumulated before the player's first season, or a dummy variable identifying if the roster of the player's team in the first season included a top-15 player. Performance_i signifies the average annual growth of the four performance metrics described in the previous section over the first five seasons for player i. We exclude the first season if X is the number of team wins in the first season. W_i and Z_i are vectors of control variables, with θ_{team} and η_{team} as team fixed effects. λ_{pick} and ω_{pick} serve as a player's draft pick number fixed effects, which is a proxy for the rank of the player.

The "luck" variable serves as an instrumental variable for X, given its exogeneity and relevance. Using this instrumental variable approach, we aim to isolate the causal effect of early-career environments, represented by X, on the long-term performance progression of NBA players.

Table 3: IV First Stage Regressions

	Team Wins	Coach Success	Top Peer
	(1)	(2)	(3)
Luck	0.381***	12.961***	0.011***
	(0.095)	(2.799)	(0.004)
Controls	Y	Y	Y
Team FE	Y	Y	Y
Draft Pick FE	Y	Y	Y
Observations	354	354	354
Note:			*p<0.1; **p<0.05; ***p<0.01

Notes: Each column represents a different variable of interest of this study. Team Wins is the number of wins the player's team achieved in his first season. Coach Success is the number of player's coach NBA wins before player entered the league. Top Peer is a dummy variable that equals 1 if player's team included a top-15 NBA player (according to All-NBA vote in the previous season). All models include control variables such as player age, height, and college experience. Team Fixed Effects (FE) and Draft Pick Fixed Effects (FE) are included to account for team-level and pick-level heterogeneity. Standard errors are reported in parentheses.

5 Results

In this section, we outline the main findings of our study. We start by examining the impact of early success, represented by the number of wins a player's team achieves in his first NBA season. Subsequently, we explore the influence of a coach's prior successes on player performance, quantified by coaches' career wins in the NBA. Finally, we assess the role of playing alongside a star player during the first season in the NBA. For each of these factors, we consider their effects on four key performance metrics: True Shooting Percentage (TS), Win Shares (WS), Player Efficiency Rating (PER), and Value Over Replacement Player (VORP).

5.1 Early Winning

5.1.1 Main Results

The results from Table 4 shed light on the significant impact of the early winning experience on the long-term performance of NBA players. This table presents four regressions, each representing a different performance metric (TS, WS, PER, VORP).

Our findings suggest that the number of wins a player's team achieves during his first season has a statistically significant positive effect on all four performance metrics (PER and VORP marginally significant). Specifically, for each additional win in the debut season, the annual growth in True Shooting Percentage increases by 0.003 ($p < 0.05$), in Win Shares rises by 0.003 ($p < 0.05$), in Player Efficiency Rating increases by 0.199 ($p < 0.1$), and in VORP increases by 0.015 ($p < 0.1$). All the effects are approximately 0.05 standard deviations, which is substantial since the number of wins in the first season varied in the sample from 7 to 72. We also analyze specifications with various sets of fixed effects as robustness check (see Appendix A5).

Several potential mechanisms might explain the result. First, psychological factors could be at play. Winning early in one's career can positively affect a player's mental state, enhance

self-confidence and reduce performance anxiety. Second, elevated testosterone and dopamine levels triggered by positive experience of winning can also boost efficiency of training sessions, which is particularly beneficial for rookies still adapting to NBA rigors. Third, the experience of winning itself can be educational. It exposes players to correct strategies, teamwork, and plays that lead to success, effectively fast-tracking their learning curve. It is also worth mentioning that early wins are impactful for players and can signal teams and coaches to recognize potential talent and invest further in the development of players.

5.1.2 Heterogeneity

This section describes the nuanced effects of early team success on long-term performance across different subsets of NBA players, specifically focusing on nationality and age at draft. Through a heterogeneity analysis, we aim to uncover whether positive impacts of early career wins vary among players, offering a richer understanding of how specific contexts influence professional development trajectories.

Table 5 investigates the interaction between a player's nationality (US-born or not) and the number of wins in his first NBA season. The findings indicate a significant interaction effect for True Shooting Percentage (TS%) and Player Efficiency Rating (PER), suggesting that non-US players benefit more from early team success compared to their US-born counterparts. Specifically, negative coefficients for the interaction terms in TS% and PER imply that the positive impact of first-season wins on these performance metrics is less pronounced for US-born players. This disparity could be attributed to several factors, including differences in prior exposure to competitive basketball, cultural adjustments, and variations in support systems available to players based on their nationality. Non-US players might experience a steeper learning curve upon entering the NBA, making the positive reinforcement from early career wins more impactful for their development.

Table 6 explores the interaction between players' age at the time of the draft (specifically

Table 4: The Impact of Early Winning on Long-Term Performance

	TS	WS	PER	VORP
	(1)	(2)	(3)	(4)
First Season Wins	0.003**	0.003**	0.199*	0.015*
	(0.001)	(0.002)	(0.105)	(0.008)
Controls	Y	Y	Y	Y
Team FE	Y	Y	Y	Y
Draft Pick FE	Y	Y	Y	Y
Observations	553	547	553	547

Note: *p<0.1; **p<0.05; ***p<0.01

Notes: Each column represents a different performance metric for NBA players. TS is the True Shooting Percentage, calculated as the number of points divided by twice the sum of field goal attempts and (0.44) times free-throw attempts. WS represents Win Shares, an estimate of the number of wins contributed by a player. PER is the Player Efficiency Rating, a measure of a player's per-minute productivity. VORP stands for Value Over Replacement Player, which estimates the point difference between a player and a replacement-level player per 100 possessions. First Season Wins is the number of wins the player's team secured during his first season in the NBA. All models include control variables such as player age, height, and college experience. Team Fixed Effects (FE) and Draft Pick Fixed Effects (FE) are included to account for team-level and pick-level heterogeneity. Standard errors are reported in parentheses.

Table 5: The Impact of First Season Wins Varies Based on Nationality

	TS %	WS	PER	VORP
	(1)	(2)	(3)	(4)
F. Season W	0.003**	0.003**	0.222**	0.010*
	(0.001)	(0.001)	(0.096)	(0.006)
F. Season W X US	−0.002*	−0.001	−0.131**	−0.002
	(0.001)	(0.001)	(0.065)	(0.004)
Controls	Y	Y	Y	Y
Team FE	Y	Y	Y	Y
Draft Pick FE	Y	Y	Y	Y
Observations	553	547	553	547
Note:				*p<0.1; **p<0.05; ***p<0.01

Notes: Each column represents a different performance metric for NBA players. TS % is the True Shooting Percentage, calculated as the number of points divided by twice the sum of field goal attempts and (0.44) times free-throw attempts. WS represents Win Shares, an estimate of the number of wins contributed by a player. PER is the Player Efficiency Rating, a measure of a player's per-minute productivity. VORP stands for Value Over Replacement Player, which estimates the point difference between a player and a replacement-level player per 100 possessions. Coach Wins is the number of wins the coach of the player in the first season won in NBA prior to this season. All models include control variables such as player age, height, and college experience. Team Fixed Effects (FE) and Draft Pick Fixed Effects (FE) are included to account for team-level and pick-level heterogeneity. Standard errors are reported in parentheses. Additionally, we include the interaction term of a US-born dummy with the number of first season wins.

distinguishing players older than 22[3]) and first-season team wins. The analysis reveals that the direct impact of first-season wins on Win Shares (WS) and Value Over Replacement Player (VORP) remains consistently positive. The presence of positive significant coefficients for the interaction term in WS and PER hints that older players might benefit more from early team successes compared to their younger peers. This difference could be due to older players being more experienced and thus more affected by the to influences of their initial NBA environment.

The heterogeneity analysis underscores the complex interplay between a player's background characteristics and his professional development within the NBA. The findings suggest that external factors such as nationality and age at entry can moderate the benefits derived from early career successes. For non-US players, early wins appear to be particularly beneficial, potentially due to their different paths to the NBA and the need to adjust to a new competitive and cultural environment. Similarly, there is an indication that older players may slightly benefit more from positive early-career experience.

5.2 Coach Experience

5.2.1 Main Results

The results depicted in Table 7 delve into the influence of coach success on the long-term performance metrics of NBA players. The table features four different models, each focusing on the same four performance indicators.

The number of wins achieved by a player's coach in past NBA seasons before the player's first season seems to significantly impact three out of four performance metrics. Specifically, for each extra win in the coach's career before the player's first season, the annual growth in True Shooting Percentage increases by 0.0001 ($p < 0.05$), in Win Shares rises by 0.0001 ($p < 0.05$), and in the Player Efficiency Rating improves by 0.008 ($p < 0.05$). While the per-win impact may seem small, it is crucial to remember that these coaches often have hundreds

[3]Median age in the sample.

Table 6: The Impact of Early Wins Varies Based on Age

	TS %	WS	PER	VORP
	(1)	(2)	(3)	(4)
F. Season W	0.002	0.002**	0.110	0.009*
	(0.001)	(0.001)	(0.085)	(0.005)
F. Season W X Age>22	0.001	0.003**	0.149*	−0.002
	(0.001)	(0.001)	(0.085)	(0.005)
Controls	Y	Y	Y	Y
Team FE	Y	Y	Y	Y
Draft Pick FE	Y	Y	Y	Y
Observations	553	547	553	547
Note:				*p<0.1; **p<0.05; ***p<0.01

Notes: Each column represents a different performance metric for NBA players. TS % is the True Shooting Percentage, calculated as the number of points divided by twice the sum of field goal attempts and (0.44) times free-throw attempts. WS represents Win Shares, an estimate of the number of wins contributed by a player. PER is the Player Efficiency Rating, a measure of a player's per-minute productivity. VORP stands for Value Over Replacement Player, which estimates the point difference between a player and a replacement-level player per 100 possessions. Coach Wins is the number of wins the coach of the player in the first season won in NBA prior to this season. All models include control variables such as player age, height, and college experience. Team Fixed Effects (FE) and Draft Pick Fixed Effects (FE) are included to account for team-level and pick-level heterogeneity. Standard errors are reported in parentheses. Additionally, we include the interaction term of a dummy that takes value 1 if player is older than 22 while being drafted with the number of first season wins.

of career wins. When looking at a coach with 300 career wins, the incremental effects can translate into a notable advantage for a player: a 0.03 increase in True Shooting Percentage, a 0.03 increase in Win Shares, and a 2.4 increase in Player Efficiency Rating. These effects would be similar to ten additional wins in the first season according to the results from Table 4.

Several plausible mechanisms might explain this relationship. Firstly, a successful coach often has substantial experience and strategic insight, which can be invaluable for young players. Exposure to effective strategies, training regimes, and in-game decision-making can enhance a player's skills, offering a smoother transition into the league. Secondly, a winning coach can set a culture of excellence, instilling in young players attitudes, work ethics, and teamwork skills conducive to long-term success. Such a culture can have a 'ripple effect,' benefiting not just individual players but the entire team. Last, it may be that successful coaches have more resources to invest in player development, amplifying the positive effects of their winning records.

5.2.2 Heterogeneity

Our analysis of heterogeneity in the impact of coach experience on player performance further elucidates how diverse player backgrounds modulate benefits derived from experienced coaching. By examining the interaction between coach wins and players' nationality (US-born versus non-US players) as well as their age at the draft, we uncover insights into the dynamics of professional development within the NBA. These findings complement our understanding of how early career environments, specifically the influence of a coach's prior success, shape long-term player performance.

Table 8 examines how a coach's past successes impact players differently based on nationality. In contrast to heterogeneity results of early winning, there appears to be no significant differentiation in the effect of coach experience on player performance when comparing US-born players to their non-US counterparts. The interaction terms between coach wins and

Table 7: The Impact of a Successful Coach on Long-Term Performance

	TS	WS	PER	VORP
	(1)	(2)	(3)	(4)
Coach Wins	0.0001**	0.0001**	0.008**	0.0004
	(0.0001)	(0.0001)	(0.004)	(0.0003)
Controls	Y	Y	Y	Y
Team FE	Y	Y	Y	Y
Draft Pick FE	Y	Y	Y	Y
Observations	581	573	581	573
Note:				*p<0.1; **p<0.05; ***p<0.01

Notes: Each column represents a different performance metric for NBA players. TS is the True Shooting Percentage, calculated as the number of points divided by twice the sum of field goal attempts and (0.44) times free-throw attempts. WS represents Win Shares, an estimate of the number of wins contributed by a player. PER is the Player Efficiency Rating, a measure of a player's per-minute productivity. VORP stands for Value Over Replacement Player, which estimates the point difference between a player and a replacement-level player per 100 possessions. Coach Wins is the number of wins the coach of the player in the first season won in NBA prior to this season. All models include control variables such as player age, height, and college experience. Team Fixed Effects (FE) and Draft Pick Fixed Effects (FE) are included to account for team-level and pick-level heterogeneity. Standard errors are reported in parentheses.

player nationality for all performance metrics are statistically insignificant. This outcome suggests that the beneficial influence of experienced coaching on player development offers a universal advantage to players regardless of their origin. It implies that the knowledge, strategy, and mentorship provided by a seasoned coach are equally valuable to all players, potentially leveling the playing field in terms of developmental opportunities afforded by coaching, irrespective of a player's nationality.

Table 9 examines the interaction between coach wins and the age of players at the time of drafting (specifically, those aged 22 or older). The interaction term for Player Efficiency Rating (PER) is both positive and statistically significant, hinting at a marginal propensity for older players to benefit more from experienced coaching in terms of efficiency on the court. This finding is consistent with previous results of early winning and suggests that older players may be in a better position to leverage the insights and guidance offered by seasoned coaches, potentially due to their greater maturity or prior experience that make them more receptive to high-level mentorship.

The findings from this heterogeneity analysis reveal that the benefits of experienced coaching in the NBA are broadly applicable across different player demographics, with limited evidence to suggest significant variations based on nationality or age. The lack of differentiation based on nationality reinforces the value of skilled coaching as a universal tool for player development, emphasizing the importance of investing in knowledgeable and experienced coaching staff to foster talent across the board.

The slight advantage observed for older players in terms of efficiency gains under experienced coaching could indicate the importance of targeting and tailoring coaching strategies to unique needs and receptiveness of players at different stages of their career. While the effects are not drastic, they underscore the potential for specific coaching approaches that consider the individual backgrounds and experience of players to maximize their development and performance outcomes.

Table 8: The Impact of Coaching X Nationality

	TS %	WS	PER	VORP
	(1)	(2)	(3)	(4)
Coach Wins	0.0001**	0.0001	0.007*	0.0003
	(0.0001)	(0.0001)	(0.004)	(0.0003)
Coach Wins X US	−0.00001	0.00004	−0.0004	0.0002
	(0.00003)	(0.00003)	(0.002)	(0.0002)
Controls	Y	Y	Y	Y
Team FE	Y	Y	Y	Y
Draft Pick FE	Y	Y	Y	Y
Observations	581	573	581	573
Note:				*p<0.1; **p<0.05; ***p<0.01

Notes: Each column represents a different performance metric for NBA players. TS % is the True Shooting Percentage, calculated as the number of points divided by twice the sum of field goal attempts and (0.44) times free-throw attempts. WS represents Win Shares, an estimate of the number of wins contributed by a player. PER is the Player Efficiency Rating, a measure of a player's per-minute productivity. VORP stands for Value Over Replacement Player, which estimates the point difference between a player and a replacement-level player per 100 possessions. Coach Wins is the number of wins the coach of the player in the first season won in NBA prior to this season. All models include control variables such as player age, height, and college experience. Team Fixed Effects (FE) and Draft Pick Fixed Effects (FE) are included to account for team-level and pick-level heterogeneity. Standard errors are reported in parentheses. Additionally, we include the interaction term of the US-born dummy with the number of coach wins.

Table 9: The Impact of Coaching X Age

	TS %	WS	PER	VORP
	(1)	(2)	(3)	(4)
Coach Wins	0.0001	0.0001**	0.005	0.0004
	(0.00005)	(0.0001)	(0.004)	(0.0003)
Coach Wins X Age>21	0.00003	0.00000	0.004**	0.0001
	(0.00003)	(0.00003)	(0.002)	(0.0001)
Controls	Y	Y	Y	Y
Team FE	Y	Y	Y	Y
Draft Pick FE	Y	Y	Y	Y
Observations	581	573	581	573

Note: *p<0.1; **p<0.05; ***p<0.01

Notes: Each column represents a different performance metric for NBA players. TS % is the True Shooting Percentage, calculated as the number of points divided by twice the sum of field goal attempts and (0.44) times free-throw attempts. WS represents Win Shares, an estimate of the number of wins contributed by a player. PER is the Player Efficiency Rating, a measure of a player's per-minute productivity. VORP stands for Value Over Replacement Player, which estimates the point difference between a player and a replacement-level player per 100 possessions. Coach Wins is the number of wins the coach of the player in the first season won in NBA prior to this season. All models include control variables such as player age, height, and college experience. Team Fixed Effects (FE) and Draft Pick Fixed Effects (FE) are included to account for team-level and pick-level heterogeneity. Standard errors are reported in parentheses. Additionally, we include the interaction term of a dummy that takes value 1 if player is older than 21 while being drafted with the number of coach wins.

5.3 Presence of a 'Star'

Table 10 explores the potential impact of having a star player—defined as one of the top 15 players in the league—on a team during a player's first season. The variables examined are the same as in the previous tables: TS, WS, PER, VORP.

Contrary to the existing literature on peer effects, the presence of a star player in the debut season does not yield statistically significant results in affecting long-term performance metrics, except for marginal significance in Win Shares ($p < 0.1$). It is possible that the influence of a star player is not as straightforward as one might assume. For example, while a star player may offer a wealth of experience and skill, his dominating presence could overshadow the development of a new player or even contribute to a more rigid team dynamic that does not facilitate the growth of new talent.

This discrepancy in our findings compared to the existing literature may be attributed to the unique dynamics of basketball, which demands a high level of teamwork for success. Unlike many studies focusing on individual performance metrics — such as academic achievements that rely on personal abilities to excel in exams — basketball's success relies on effective team collaboration. The 'top player' in our study is identified based on individual performance metrics, which do not necessarily reflect their ability to collaborate or enhance team play. This distinction is crucial, as it suggests that mere the presence of a top individual performer in a team does not automatically translate into effective mentorship or positive peer effects for new players.

Another critical factor is the competitive nature of basketball, particularly regarding playing time. Rookies need more time on the court, which unavoidably create a competitive environment with established players, possibly limiting opportunities for mentorship and guidance. This competitive dynamic can impact the potential positive influence of top-performing players on rookies.

Moreover, our study differs from the literature in its temporal perspective. While most studies assess the immediate spillover effects of high-performing peers, our analysis examines

the long-term impact. In our context, the 'treatment' — exposure to a star player — occurred in the past, and its effects are measured five years later. This raises the possibility that either continuous interaction with a top performer is essential or that a single year of exposure may not be sufficient to produce a lasting impact on a player's performance.

Table 10: The Impact of a Star Player on Long-Term Performance

	TS	WS	PER	VORP
	(1)	(2)	(3)	(4)
Star Presence	0.107	0.123*	8.031	0.511
	(0.069)	(0.071)	(5.329)	(0.341)
Controls	Y	Y	Y	Y
Team FE	Y	Y	Y	Y
Draft Pick FE	Y	Y	Y	Y
Observations	516	511	516	511
Note:				*p<0.1; **p<0.05; ***p<0.01

Notes: Each column represents a different performance metric for NBA players. TS is the True Shooting Percentage, calculated as the number of points divided by twice the sum of field goal attempts and (0.44) times free-throw attempts. WS represents Win Shares, an estimate of the number of wins contributed by a player. PER is the Player Efficiency Rating, a measure of a player's per-minute productivity. VORP stands for Value Over Replacement Player, which estimates the point difference between a player and a replacement-level player per 100 possessions. Star presence is a dummy variable for playing with top-15 player in the league in the first season. All models include control variables such as player age, height, and college experience. Team Fixed Effects (FE) and Draft Pick Fixed Effects (FE) are included to account for team-level and pick-level heterogeneity. Standard errors are reported in parentheses.

6 Conclusion

This study explores the long-term impact of early-career environments on NBA players' performance metrics. We scrutinized three crucial factors: early team wins, coaching experience, and the presence of a star player during the first season. Our investigation reveals that early-career environments have a substantial influence on a player's long-term performance.

The number of wins in the first season positively affects all examined metrics. These findings echo broader labor market evidence that suggests the initial years of a professional career can set the stage for future success: choosing a successful team can boost worker's long-term performance.

Similarly, we find that the experience of a coach, measured by career wins, significantly affects player performance. This can be extended beyond the sports realm to emphasize the pivotal role experienced leadership can play in any profession.

Intriguingly, our results counter the established evidence of positive peer effects. Merely playing alongside a star player in a player's first year does not boost long-term performance metrics. This adds a layer of complexity to our understanding of professional development.

This research adds to the growing evidence that early-career environments have long-lasting impacts on performance metrics. It highlights the importance of a nurturing early-career environment and experienced mentorship.

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A Appendix

A.1 Common NBA Abbreviations

In the National Basketball Association (NBA) context, several abbreviations are commonly used to denote various statistics and metrics. Below is a list of some of these critical abbreviations and their meanings:
PTS: Points Scored.
TRB: Total Rebounds, encompassing both offensive and defensive rebounds.
DRB: Defensive Rebounds.
ORB: Offensive Rebounds.
AST: Assists, indicating the number of times a player passes the ball leading directly to a score.
STL: Steals represent the number of times a player takes the ball from an opponent.
BLK: Blocks, denoting the number of times a player prevents an opponent's shot from scoring.
TOV: Turnovers refer to losing ball possession without a shot attempt.
PF: Personal Fouls, indicating a player's number of personal fouls.
3P: Three-Point Field Goals Made.
FG: Field Goals Made, including both two-point and three-point field goals.
FGA: Field Goal Attempts denote the total number of field goal shots attempted.
FTA: Free Throw Attempts, representing the number of free throws attempted.
FT: Free Throws Made.
FGM: Field Goal Made denotes the total number of field goal shots made.
PF: Personal Fouls denote the personal number of fouls committed.
MP: Minutes Played.
lg: League prefix.
TM: Team prefix.
DR: Defensive Rating.
OR: Offensive Rating.
POS: Possessions.

A.2 Win Shares Calculation

Win Shares is a calculation that distributes credit for team success to individual players. It is divided into Offensive Win Shares (OWS) and Defensive Win Shares (DWS):

$$WS = OWS + DWS$$

A.2.1 Offensive Win Shares (OWS)

Offensive Win Shares are derived from a player's offensive production in context with the team's overall efficiency.

$$OWS = \frac{PointsProduced}{PointsPerWin}$$

Where PointsProduced is calculated as:

$$PointsProduced = \text{PTS} + \text{FGM} \times (\text{tmAST} \times \frac{2}{3}) + \text{FTM} - \text{FGA} - \text{TOV}$$

PointsPerWin is based on the league's average efficiency:

$$PointsPerWin = \frac{lgPTS}{lgWins} \times \frac{1}{\text{tmPace}}$$

A.2.2 Defensive Win Shares (DWS)

Defensive Win Shares are based on the team's defensive efficiency and the player's role.

$$DWS = \frac{1}{2} \times \text{tmGames} \times \frac{\text{DR}}{\text{lgDR}} \times \frac{\text{POS}}{\text{tmPOS}}$$

Where Player Defensive Rating can be calculated as:

$$PlayerDefensiveRating = \text{Individual Defensive Stops} + \text{Defensive Stops Share}$$

Individual Defensive Stops (IDS) can be estimated by:

$$IDS = \text{STL} + \text{BLK} \times \text{BLK Factor} - \text{PF} \times \text{PF Factor} + \text{DRB} \times \text{DRB Factor}$$

Defensive Stops Share involves the percentage share of team defensive stops a player is estimated to have taken part in, based on minutes played and the defensive rating.

A.3 Player Efficiency Rating (PER) Calculation

PER is calculated as follows:

$$\text{PER} = \left(uPER \times \frac{\text{lgPace}}{\text{tmPace}} \right) \times \frac{15}{\text{lguPER}}$$

where $uPER$ is calculated as:

$$\begin{aligned} uPER = & \frac{1}{\text{MP}} \times \left(3P - \frac{\text{PF} \times \text{lgFT}}{\text{lgPF}} + \left[\frac{\text{FT}}{2} \times \left(2 - \frac{\text{tmAST}}{3 \times \text{tmFG}} \right) \right] \right. \\ & + \left[\text{FG} \times \left(2 - \frac{\text{fA} \times \text{tmAST}}{\text{tmFG}} \right) \right] + \frac{2 \times \text{AST}}{3} \\ & + \text{VOP} \times \left[\text{DRBP} \times \Big(2 \times \text{ORB} + \text{BLK} - 0.2464 \times [\text{FTA} - \text{FT}] \right. \\ & - [\text{FGA} - \text{FG}] - \text{TRB} \Big) + \frac{0.44 \times \text{lgFTA} \times \text{PF}}{\text{lgPF}} \\ & \left. \left. - (\text{TOV} + \text{ORB}) + \text{STL} + \text{TRB} - 0.1936\,(\text{FTA} - \text{FT}) \right] \right) \end{aligned}$$

where,
$\text{fA} = \frac{2}{3} - \left[\left(0.5 \times \frac{\text{lgAST}}{\text{lgFG}} \right) \div \left(2 \times \frac{\text{lgFG}}{\text{lgFT}} \right) \right]$,
$\text{VOP} = \frac{\text{lgPTS}}{\text{lgFGA} - \text{lgORB} + \text{lgTO} + 0.44 \times \text{lgFTA}}$,
$\text{DRBP} = \frac{\text{lgTRB} - \text{lgORB}}{\text{lgTRB}}$.

A.4 Value Over Replacement Player (VORP)

The Value Over Replacement Player (VORP) is based on Box Plus/Minus (BPM), which estimates a player's performance per 100 possessions above a league-average player's. The formula for VORP is:

$$\text{VORP} = (\text{BPM} - \text{Replacement Level}) \times \left(\frac{\text{MP}}{\text{tmMP}} \right) \times \left(\frac{\text{tmGames}}{82} \right)$$

where,
BPM is the Box Plus/Minus.
Replacement Level is typically set at -2.0 in the NBA.

Box Plus/Minus (BPM) is a basketball box score-based metric that estimates a player's

contribution to the team per 100 possessions played compared to a league-average player, translated to an average team. The formula for BPM is derived from a regression analysis and is as follows:

$$\begin{aligned}\text{BPM} =& a_1 \cdot (\text{PTS}) + a_2 \cdot (\text{TRB}) + a_3 \cdot (\text{AST}) + a_4 \cdot (\text{STL}) + a_5 \cdot (\text{BLK}) - a_6 \cdot (\text{TOV}) \\ & - a_7 \cdot (\text{PF}) + a_8 \cdot (\text{3P}) + a_9 \cdot (\text{FG}) - a_{10} \cdot (\text{FGA}) - a_{11} \cdot (\text{FTA}) + a_{12} \cdot (\text{FT})\end{aligned}$$

where $a_1, a_2, \ldots, a_{12}$ are coefficients derived from the regression model. The actual coefficients are obtained through a linear regression model that predicts the player's impact on the team's performance. These coefficients are updated regularly based on evolving player data and may differ from the ones used in the original BPM calculation. This formula also adjusts for pace and team context.

A.5 Robustness Checks

Table 11: The Impact of Early Winning on Long-Term Performance

	TS	TS	TS
	(1)	(2)	(3)
First Season Wins	0.015***	0.002**	0.010
	(0.001)	(0.001)	(0.007)
Controls	Y	Y	Y
Team FE	N	N	Y
Draft Pick FE	N	Y	N
Observations	553	553	553
Note:	*p<0.1; **p<0.05; ***p<0.01		

Notes: TS is the True Shooting Percentage, calculated as the number of points divided by twice the sum of field goal attempts and (0.44) times free-throw attempts. First Season Wins is the number of wins the player's team achieved in his first season. Model (1) includes only controls, model (2) includes controls and draft pick fixed effects, model (3) includes controls and team fixed effects. All models include control variables such as player age, height, and college experience. Standard errors are reported in parentheses.

Table 12: The Impact of Early Winning on Long-Term Performance

	VORP	VORP	VORP
	(1)	(2)	(3)
First Season Wins	−0.002	0.009*	0.046
	(0.002)	(0.005)	(0.036)
Controls	Y	Y	Y
Team FE	N	N	Y
Draft Pick FE	N	Y	N
Observations	547	547	547
Note:	*p<0.1; **p<0.05; ***p<0.01		

Notes: VORP stands for Value Over Replacement Player, which estimates the point difference between a player and a replacement-level player per 100 possessions. First Season Wins is the number of wins the player's team achieved in his first season. Model (1) includes only controls, model (2) includes controls and draft pick fixed effects, model (3) includes controls and team fixed effects. All models include control variables such as player age, height, and college experience. Standard errors are reported in parentheses.

Table 13: The Impact of Early Winning on Long-Term Performance

	PER	PER	PER
	(1)	(2)	(3)
First Season Wins	0.293***	0.148**	1.090
	(0.042)	(0.071)	(0.746)
Controls	Y	Y	Y
Team FE	N	N	Y
Draft Pick FE	N	Y	N
Observations	553	553	553
Note:		*p<0.1; **p<0.05; ***p<0.01	

Notes: PER is the Player Efficiency Rating, a measure of a player's per-minute productivity.Team Wins is the number of wins the player's team achieved in his first season. Model (1) includes only controls, model (2) includes controls and draft pick fixed effects, model (3) includes controls and team fixed effects. All models include control variables such as player age, height, and college experience. Standard errors are reported in parentheses.

Table 14: The Impact of Early Winning on Long-Term Performance

	WS	WS	WS
	(1)	(2)	(3)
First Season Wins	-0.001^{**}	0.002^{**}	0.010
	(0.0005)	(0.001)	(0.007)
Controls	Y	Y	Y
Team FE	N	N	Y
Draft Pick FE	N	Y	N
Observations	547	547	547
Note:	*p<0.1; **p<0.05; ***p<0.01		

Notes: WS represents Win Shares, an estimate of the number of wins contributed by a player. First Season Wins is the number of wins the player's team achieved in his first season. Model (1) includes only controls, model (2) includes controls and draft pick fixed effects, model (3) includes controls and team fixed effects. All models include control variables such as player age, height, and college experience. Standard errors are reported in parentheses.

Abstrakt

Tento článek zkoumá vliv prostředí na začátku kariéry na dlouhodobou výkonnost. S využitím kvazi-náhodnosti systému draftové loterie NBA izolujeme dopady počátečního úspěchu týmu, zkušeností trenéra a přítomnosti hvězdného hráče během debutové sezóny basketbalisty. Naše zjištění zdůrazňují významný pozitivní vliv počátečních týmových vítězství a zkušených trenérů na budoucí výkonnost hráčů. Překvapivě se ukazuje, že hra po boku hvězdného hráče v prvním roce nemá silný vliv. Tato studie nabízí poznatky, které přesahují rámec sportu, a zdůrazňuje trvalé účinky raných profesionálních zkušeností a mentorství na kariérní dráhy.

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