

The Role of PLL Athletic Metrics in Shaping Network Externality Effects on Social Media

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Abstract. This study investigates how athletic performance influences the number of Instagram followers, revealing the role of social media network externalities in the Premier Lacrosse League (PLL). Using comprehensive player performance data and social media metrics from the 2024 season, the study employs a grouped regression model to analyze the effects of scoring, assists, and steals on follower count, while examining the heterogeneity between offensive/midfield and defensive players. Results show that scoring and assists significantly and positively affect follower counts for offensive players, whereas the athletic performance of defensive players has limited impact on their social media influence. Additionally, both professional experience and social media experience exhibit strong positive effects across player groups. The findings highlight the interaction between athletic performance and digital presence in niche sports, offering empirical insights into personal brand building and strategic communication. This study underscores the importance of offensive performance in enhancing player visibility and suggests that media strategies should be tailored to player roles. It also recommends future research to incorporate time-series data in order to better capture the dynamics of social media growth over time and further clarify the mechanisms behind network externality effects in professional sports.

Keywords: Athletic Performance, Social Media Externality, Instagram Followers, Premier Lacrosse League (PLL)

1. Introduction

Social media has become an important indicator for measuring athlete influence and market mechanisms in the digital age. For professional athletes, social platforms such as Instagram are not only tools for interacting with fans, but also important sources of personal brand building, business cooperation and economic benefits [1]. Especially in niche sports such as lacrosse, the influence of social media may become a key factor in athletes' career development and market competitiveness [2]. Therefore, exploring the mechanism of the influence of competitive performance on athletes' social media influence, especially how to influence the number of Instagram fans through competitive indicators, has important theoretical and practical value.

Existing studies have shown that there is a certain positive correlation between athletes' competitive performance and the number of their social media fans. For example, in mainstream sports such as basketball and football, high scores, assists or outstanding performances in key games

can often attract more fans. However, in the niche sport of lacrosse, the relationship between competitive indicators and social media influence has not been systematically studied. Do athletes in different positions (such as offensive and defensive types) have different influence on social media? Which competitive indicators are most likely to attract fans' attention? There is still a lack of empirical analysis on these issues.

This study aims to fill this research gap and empirically analyze the impact of athletes' competitive performance on the number of Instagram fans in the lacrosse professional league. Specifically, this study will examine the impact of core competitive indicators such as scoring, assists, and steals on the number of social media fans, and analyze whether the player's position (offense/defense) has a moderating effect on this relationship. In addition, in order to improve the accuracy of the analysis, the study will also control factors such as age, professional experience, team ranking, and social media experience.

This study not only helps to expand the theoretical understanding of social media network externalities, but also provides empirical support for niche sports athletes to optimize personal brand strategies. By revealing the mechanism of the influence of competitive performance on social media, this study can provide decision-making basis for lacrosse and managers, helping them to manage personal social media more effectively, improve market competitiveness, and promote the overall development of lacrosse.

2. Literature review

With a documented history of more than a thousand years, the sport of lacrosse has undergone various adaptations and stages of development. As a sport widely competed at the high school and college level in North America, it is surprising to see a lag behind in developing its professional version. However, things are gradually changing with the efforts of Mike and Paul Rabil, co-founders of the current pro lacrosse league— PLL (Premier Lacrosse League). Together, they built a league that prioritizes the players and focuses on providing a better pro lacrosse experience for athletes and audiences. Past research regarding lacrosse is generally about the history and driving factors leading to the modernization of the sport. The current literature shows a lack of data analysis due to insufficient data and a relatively modest economic impact compared to the big sports leagues. But with recent progress in the league, including the assignment of home cities to the eight existing lacrosse teams (coupled with the touring model) and Paul's ideas of growing the sport, as revealed in podcasts, the need for relevant research has seen a boost [3].

As stated in the abstract, this study focuses on the impact of internet externality via player performance in the PLL. Unlike other sports leagues which possess profound rivalry and culture and build the business upon them, the Premier Lacrosse League seeks to build culture via modern media. With the media rights deal secured with ESPN spanning from 2022 through 2025, PLL can broadcast all its games on the largest sports platform. Thanks to that, the league viewership has seen a great improvement from an average viewership of 150,000 in 2022 to an average of 254,000 viewers in the regular season of 2023 [4]. All of the gains in viewership and popularity tie back to the league's unique approach to limited attention— utilizing modern media to secure a larger fan base. This is exercising the concept of internet externality, which illustrates the influence of media on populations that were previously not involved in particular events. For example, the rise of social media gave teams a chance to increase publicity by sharing stories and interesting trivia. Also, players in the league can help by growing their social media platforms. This benefits the league they're participating in by providing a link in the bio which leads to the league's home page.

On the other hand, players can gain market power for the league by improving their performance on the field. As a game that's seen its modernization in the late 20th century, there is a lot to add in terms of techniques. A potential pathway is securing sponsorships through strong performance. By making the league games competitive and easy to follow, PLL can gain both audience and market power. This could be reflected by "ground-breaking dealerships", as mentioned by Paul, which enables more exposure of the league to certain brand consumers.

Nowadays, social media has become a main platform for the interaction of fans and professional athletes. Past research has shown a positive relationship between athlete performance and social media engagement. The theory generally holds in the lacrosse world, with star players having about 20,000 followers on Instagram and others having a few thousand.

3. Variable design and model

In this study, objective is to investigate how athletic performance affects the number of Instagram followers, highlighting the externality effects of social media networks. The data used in this study is sourced from the official PLL website and Instagram. The former provides information about athletes' performance in matches, while the latter offers detailed data on social media influence. By analyzing this dataset, this research aim to explore the relationship between athletic performance and the network externalities on social media.

3.1. Variable design

3.1.1. Dependent variable

Instagram Followers (MarketImpact): This variable represents an athlete's popularity and the extent of their influence on the social media platform. The number of followers reflects the network effects of the athlete on social media and serves as a crucial indicator of externality in social media marketing.

3.1.2. Independent variables

To assess the impact of athletic performance on the number of Instagram followers, three performance indicators are selected:

Scoring: Reflects the athlete's ability to score in matches, directly influencing their visibility and popularity on social media.

Assists: Represents the athlete's teamwork and organizational skills. Although assists do not directly lead to scores, they demonstrate the athlete's critical role in the game, indirectly affecting their popularity.

Steals: As a reflection of defensive capability, steals are a key metric indicating an athlete's performance on the defensive end. Although its direct impact on follower count may be limited, it remains a valid measure of competitiveness.

3.1.3. Control variables

To ensure the validity of analysis, several potential confounding variables that may influence the number of followers are controlled:

Experience: The athlete's professional career length, which often indicates accumulated experience and public recognition, potentially affecting follower count.

Team Rank (TeamRank): The ranking of the athlete's team can indirectly influence personal exposure, as higher-ranked teams tend to attract more attention, thereby increasing the athlete's visibility.

Social Media Experience: The athlete's experience and activeness on social media also play a role. Those with more experience on such platforms are usually better at leveraging them to expand their influence.

Position: A binary variable where 1 indicates offensive/midfield players and 0 indicates defensive players. Player position can affect performance and exposure, as different roles receive varying levels of attention in games.

3.2. Model design

This study employs a grouped regression model to separately analyze offensive/midfield players and defensive players. The goal is to examine whether the relationship between athletic performance and Instagram followers varies based on player position. Specifically, this research categorize the regression models according to the player's on-field role (offensive/midfield vs. defense), allowing for a comparison of how performance metrics (scoring, assists, steals) affect follower count across the two groups.

The basic form of the regression model is as follows:

$$\text{Market Impact} = \beta_0 + \beta_1 \text{Scoring} + \beta_2 \text{Assists} + \beta_3 \text{Steals} + \beta_4 \text{Experience} + \beta_5 \text{Team Rank} + \beta_6 \text{Social Media Experience} + \varepsilon$$

Here, the dependent variable MarketImpact represents the number of Instagram followers, and all independent and control variables are coded and measured as described above. The regression analysis is conducted separately for offensive/midfield and defensive players to estimate coefficients for each group.

To ensure the robustness and validity of the model estimation, this research conduct multiple tests. First, this research use the Variance Inflation Factor (VIF) to check for multicollinearity; a VIF value below 10 indicates no serious multicollinearity among independent variables. Second, this research apply the Durbin-Watson test to examine residual autocorrelation; a value close to 2 suggests no autocorrelation, thereby affirming the model's assumptions.

Through the above model design and variable specification, this research aim to clearly reveal the differentiated impact of athletic performance (scoring, assists, steals) on Instagram follower count between offensive/midfield and defensive players, offering valuable insights for social media marketing strategies.

4. Results

This study's samples include the game and social media stats of all PLL players in 2024. The chart below shows the mean, standard deviation, minimum value, and maximum value of all statistics included in the study.

Table 1. Descriptive statistics of key variables in the PLL player dataset

Variables	Mean	Std.	Min	25%	Medium	75%	Max
Scoring	4.85	6.58	0	0	2	8	28
Assists	2.26	4.64	0	0	1	2	36
Steals	2.7	3.73	0	0	1	4	20
Position	0.66	0.47	0	0	1	1	1
Experience	4.42 years	3.37 years	1 year	1.75 years	3 years	7 years	14 years
TeamRank	4.53	2.35	1	2	5	7	8
Social Media Experience	136.91 months	24.99 months	5 months	134.75 months	145 months	150 months	162 months
Market Impact	9485.94	14213.84	41	2423.5	4459	9780.25	108000

As shown in table 1, the results indicate that the mean goals scored during the 2024 season were 4.85, with a huge standard deviation signaling a skewed distribution and a discrepancy in scoring abilities. The mean number of assists is 2.26, with a large standard deviation of 4.64, indicating a certain level of discrepancy in dishing passes. The mean steals is 2.7 in the 2024 season, with a standard deviation of 3.73, indicating a smaller discrepancy in defensive abilities compared to scoring and assisting (offensive abilities). A mean position of 0.66 (closer to 1) shows a relative abundance of offensive players, including midfielders, in the league, compared to defensive players. The average pro lacrosse experience is 4.42 years, with a standard deviation of 3.37 years. It can be inferred that a majority of players had a certain level of pro experience, counting the year 2024 [5]. Finally, the average social media experience is 136.91 months, signaling that they had their accounts established long before their pro career began, and thus can build a solid fan base on social media with a mean number of followers of 9485.94. The standard deviation of followers, however, is significant, indicating different levels of influence on social media platform for players in the PLL. Below is the relativity matrix of the variables of interest.

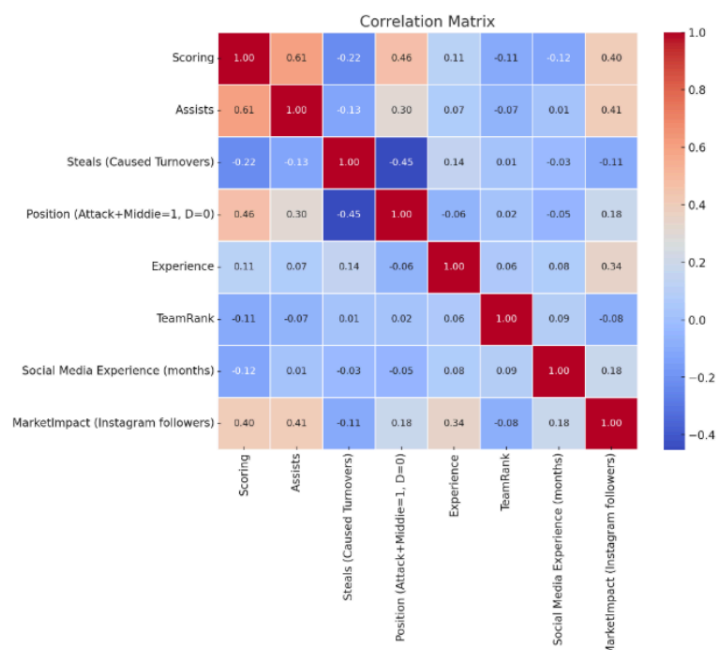


Figure 1. Correlation matrix of athletic, demographic, and social media variables

It can be seen in the matrix that scoring and instagram followers has a significant positive relationship (0.40), this suggests that higher scoring attracts followers on social media (As shown in figure 1). Also, the number of assists is also positively correlated with instagram followers. This piece combined with the previous piece shows that strong offensive abilities is often associated with higher market impact. Don't forget a player's social media experience is also strongly and positively correlated with the number of followers (0.18).

Regression Analysis:

To investigate to what extent does athletic performance influence players' market impact, This research conducted two separate regression analyses on offensive players/middies and defensive players. In short, I investigated the impact of player performance stats and control variables on the number of followers on instagram for these two groups of players (As shown in table 2 & 3).

Table 2. Regression results for offensive/midfield players

	Variables	Coef.	t	P> t
Explanatory Variables	Scoring	428.46	1.97	0.051*
	Assists	723.61	2.67	0.009**
	Steals (Caused Turnovers)	-635.54	-1.19	0.238
	Experience(months)	1764.86	4.53	0.000**
Control Variables	TeamRank	-332.17	-0.63	0.531
	Social Media Experience (months)	94.12	2.04	0.043**

* P<0.1 indicates that the variable is statistically significant at the 90% confidence level.

** P<0.05 indicates that the variable is statistically significant at the 95% confidence level.

The regression analysis featuring offensive players shows that,

Scoring has a significant impact on the number of followers in the 90% confidence interval ($p=0.051$), proving that scoring has a sound impact on offensive players' social media influence.

Assists has a significant impact on the number of followers in the 95% confidence interval ($p=0.009$), proving that assists also has a huge impact on instagram followers of offensive players.

The number of steals (caused turnovers) doesn't have a clear impact on the number of social media followers with a p-value of 0.238 [6].

Table 3. Regression results for defensive players

	Variables	Coef.	t	P> t
Explanatory Variables	Scoring	-230.04	-0.49	0.625
	Assists	1114.85	0.9	0.37
	Steals (Caused Turnovers)	36.35	0.25	0.803
	Experience(months)	381.62	1.99	0.052*
Control Variables	TeamRank	-460.04	-1.57	0.121
	Social Media Experience (months)	88.57	2.49	0.015**

* $P<0.1$ indicates that the variable is statistically significant at the 90% confidence level.

** $P<0.05$ indicates that the variable is statistically significant at the 95% confidence level.

Scoring does not significantly impact the number of followers on defensive players' instagram accounts ($p=0.625$).

Assists also has a weak impact on defensive players' social media influence ($p=0.37$).

Steals are also insignificant in terms of its impact on social media followers ($p=0.803$).

VIF Value and the Durbin-Watson Test:

Through the VIF values and the Durbin-Watson test, This research confirmed the reliability of the model. All variables had VIF values below 10, indicating no severe multicollinearity issues. The Durbin-Watson value was close to 2, suggesting no autocorrelation in the residuals, thereby ensuring the validity of the regression analysis results.

In summary, the impact of athletic performance on Instagram follower count exhibits heterogeneity. The scoring and assisting abilities of offensive players have a more significant influence on follower count, while the athletic performance of defensive players has a relatively limited effect. This provides important insights for formulating social media marketing strategies.

5. Discussion

Generally, among all the variables tested, professional lacrosse experience and social media experience showed a consistently strong positive correlation with the number of social media followers in both groups. Additionally, scoring and assist stats contributed significantly to social media externality effects in the offense group. Scoring and assisting abilities are crucial for offensive players. Being typically more creative and entertaining than defensive players, offensive players earn more media exposure and opportunities to grow their social media accounts. In the sport of lacrosse, the best estimation of a player's creativity and game level is the number of points they earn throughout the season. Thus, the result of a strong positive relationship between offensive stats (goals and assists) and the number of followers on offensive player's Instagram accounts is anticipated. It is also normal to see a strong and positive effect of professional lacrosse experience and Instagram experience on social media externality. With more years of experience with

professional lacrosse and modern media, one can develop his skills, both on the field and on social media, and subsequently earn more followers. Also, the effect of time on the number of followers is impossible to undermine. Following the passage of time is the increase in the probability of an account being naturally discovered, given that the number of followers won't decrease abruptly due to scandals and such, the social media externality effect would be expected to grow at least steadily, making the results less surprising [7].

As for other variables, such as team rankings and caused turnovers, which contributed only slightly to social media externality (having a p-value greater than 0.1), there are specific reasons that could be attributed. As a recently established league, the PLL is yet to grow the cultural side of the game. Remaining in the single-entity era, the league is still single-handedly owned by the Rabil brothers, who are founders of the business. This is the reason behind a relatively balanced league in terms of team strength. With the league itself running all eight teams, trades and strategies have been largely similar. Each team ends up possessing a few star players on both ends, making a dynasty (a single team dominating) impossible to happen. This is essentially why team rankings contribute so little to player's social media accounts. As for why caused turnovers turned out to be insignificant, the modern field lacrosse format is a main factor. With defensive and offensive players stuck on their respective ends, it is hard for the audience to focus on both the attacks and the poles. Naturally giving most of the attention to offensive players, defensive players are often omitted if not mentioned by the commentators. For this reason, caused turnovers, typically associated with defensive players, hardly help to boost a player's internet recognition [8].

Unlike other sports, such as basketball and soccer, lacrosse courts are divided into two parts by the midfield line. Attacks aren't allowed to cross the line and enter the defensive end. The same rule applies to the long poles. The player performance data certainly has a pattern in lacrosse, in which attackers are usually in charge of scoring and assisting, and defensive players are in charge of causing turnovers and shutting down plays from the opposing team. Thus, attacks are often seen with high-scoring and assist numbers but low-caused turnovers, and vice versa for defensive players. This differentiates lacrosse from many popular sports, requiring players to excel at both ends.

The development of niche sports has been a long-discussed topic. Problems of securing new audiences and people of interest are one main reason that niche sports remain niche sports. As social media looms increasingly larger, niche sports leagues can capitalize on the popularity of such platforms and introduce the game to people who are previously not familiar with it [9]. All niche sports need an opportunity to show the uniqueness of the sport and why people should participate, and so does lacrosse. This research suggest that PLL players also advocate the game by personalizing their social media accounts. For example, one thing they can do is to appeal to the history of lacrosse and its being a sport played by the ancient Iroquois people to settle disputes. This content would likely pick up history enthusiasts who are also generally interested in consuming sports.

Last but not least, this study displays some inevitable limitations. Due to the small number of players participating in the league, player performance data may not entirely reflect certain characteristics of field lacrosse at the professional level. Also, using social media followers as an indicator of the social media externality effect could risk overlooking the psychological activities of the followers. For instance, followers could simply follow a player's account because of his attractive physique. Those are all control variables that future studies should consider. For more accurate results, future studies could establish a time series model that looks at the change in the number of followers through time. This action can further prevent the effect that social media experience has on a player's internet influence [10].

6. Conclusion

This study examines the impact of player performance on social media externality, using the number of Instagram followers as a proxy measure. By collecting data on key performance indicators—goals, assists, and caused turnovers—a multivariable linear regression analysis was conducted to evaluate how these performance metrics, along with relevant control variables, influence players' online visibility. The results reveal that for offensive players, scoring, assists, professional lacrosse experience, and social media experience all positively and significantly affect their follower count. In contrast, for defensive players, although assists, professional experience, and social media experience also show positive associations with follower numbers, only the latter two reach statistical significance. This difference likely stems from the structural rules of field lacrosse that limit defensive players' visibility on the field.

The study offers a potential strategy for promoting the sport of lacrosse through modern media. To reach broader audiences, the league should increase its online presence and host both virtual and in-person events to enhance engagement. As Paul Rabil has suggested, cultivating team identity and rivalries by assigning dedicated owners to each of the eight teams may be key. The example of Mark Cuban and the Dallas Mavericks in the NBA demonstrates how passionate ownership can foster a strong team culture and expand fan bases. A similar model could help the PLL grow its audience and cultural presence.

Looking ahead, future research should incorporate additional control variables to improve analytical precision. Longitudinal studies that track changes in follower counts over time would also be valuable. Such time-series models could better capture the causal relationship between in-season performance and subsequent social media growth, offering deeper insights into the dynamics of digital influence in professional lacrosse.

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