

Identifying Potential MLB Breakout Candidates Via Barrel Rate and Advanced Metrics

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The goal of this analysis is to explore advanced metrics to identify potential breakout players in Major League Baseball. This project begins with identifying the top 10 hitters from the 2024 season in barrel rate percentage (minimum 100 plate appearances).

A barrel is a batted ball that reaches a specific combination of exit velocity and launch angle. For example, a batted ball that has an exit velocity of at least 98 mph with a launch angle between 26-31 qualifies as a barrel. As exit velocity increases, the acceptable launch angle range expands. (e.g., 99 mph : 25-31 degrees, 100 mph: 24-33 degrees. In simpler terms, barrels are batted balls that have resulted in at least a .500 batting average and 1.500 slugging percentage or better.

This analysis uses Barrels/PA %, which is the number of barrels divided by total plate appearances, instead of the traditional barrel rate, which uses batted ball events as the denominator. So, this is taking into consideration every plate appearance and not just ones where the batter is putting the ball in play. It indicates the percentage of a player's plate appearances that resulted in a barrel. Additionally, hard hit rate is another important statistic that will be used for this analysis. A hard-hit ball is one that is hit with an exit velocity of at least 95 mph, and a player's hard hit rate is the percentage of batted balls that meet that threshold.

Regression Model

To analyze the relationship between different metrics and offensive performance, I built a multiple linear regression model to predict expected weighted on-base average (xwOBA) using data from the 2024 MLB season. This model uses two predictors: hard hit percentage and barrel percentage (Barrels/PA %). This model resulted in an R-squared value of .5469 and an adjusted R-squared value of .5449, meaning that over half of the variation in xwOBA can be explained by these two variables. The residual standard error was .02513 and the F statistic was 272.8, showing the model is statistically significant. For this model, both predictors were significant. For every 1% increase in Barrels/PA %, xwOBA increases by .00864. For every 1% increase in

hard hit percentage, xwOBA increases by .00094. These results show that while both variables positively impact xwOBA, Barrels/PA% is a stronger predictor.

Top 10 Hitters by Barrels/PA % (2024, Min. 100 PA)

Player	Plate Appearances	Barrels/PA (%)	Home Runs
Judge, Aaron	704	14.9	58
Ohtani, Shohei	731	14.1	54
Soto, Juan	713	12.8	41
Stanton, Giancarlo	459	12.4	27
Carpenter, Kerry	296	11.5	18
Aranda, Jonathan	143	11.2	6
Trout, Mike	126	11.1	10
Witt Jr., Bobby	709	10.9	32
Seager, Corey	533	10.9	30
Alvarez, Yordan	635	10.6	35

This table above displays the top 10 players in barrel rate for the 2024 MLB season, along with their plate appearances and home runs. Most of the players here are considered to be elite hitters, like Aaron Judge, Shohei Ohtani, and Juan Soto. There are 3 players who have under 300 plate appearances: Kerry Carpenter, Jonathan Aranda, and Mike Trout. Trout had just 126 due to a torn meniscus and has been on this list consistently in the past when healthy. (11.8% in 2022 and 11.2% in 2019, the last 2 seasons he's had at least 400 plate appearances). Aranda is the most interesting player on this list due to his 143 plate appearances being significantly less than the other players outside of Trout. It brings up the question: if given more playing time, can he maintain this elite batted ball profile and hit more home runs?

Identifying Breakout Candidates

Top 15 Players in Predicted xwOBA						
Player	Age	PA	Hard Hit %	Barrels/PA %	xwOBA	Predicted xwOBA
Encarnacion, Jerar	26	119	58.8	10.08	0.348	0.368
Aranda, Jonathan	26	143	48.5	11.19	0.362	0.368
Smith, Pavin	28	158	44.0	10.13	0.392	0.355
Soderstrom, Tyler	22	213	49.6	9.39	0.348	0.354
Rice, Ben	25	178	36.7	9.55	0.340	0.343
Caminero, Junior	20	177	45.7	8.47	0.301	0.342
Norby, Connor	24	194	39.1	8.76	0.316	0.338
Goodman, Hunter	24	224	39.6	8.48	0.279	0.336
Noel, Jhonkensy	22	198	36.8	8.59	0.323	0.335
Casas, Triston	24	243	45.2	7.41	0.330	0.332
Grisham, Trent	27	209	46.4	7.18	0.305	0.331
Stowers, Kyle	26	209	51.3	6.22	0.290	0.328
Kirilloff, Alex	26	178	40.9	7.30	0.310	0.327
Canzone, Dominic	26	188	44.4	6.91	0.307	0.327
Myers, Dane	28	108	47.5	6.48	0.317	0.326

To further identify potential breakout candidates, I used the regression model and filtered for players with fewer than 250 plate appearances in 2024 and who were 28 or younger. The table above highlights the top 15 players (by predicted xwOBA) based on the criteria. The goal is to highlight players who could break out with increased opportunities. Several players on this list have already had success in 2025, proving the success of this model early on. As of June 16, 2025, here are the weighted runs created plus (wRC+) numbers for seven of the players: Aranda (162), Smith (135), Soderstrom(127), Rice (117), Caminero (123), Grisham (132), Stowers: (123). For the remainder of this analysis, I will focus on three players: Jonathan Aranda, Jerar Encarnacion, and Dominic Canzone. Aranda has had success again in 2025, and will be examined in further detail to league averages. Encarnacion and Canzone, while also identified in the model, have both had under 30 plate appearances so far in 2025 and have not had the chance to establish consistent success.

Jonathan Aranda

Jonathan Aranda vs. MLB Average (2024, Min. 100 PA)									
Player	Launch Angle (°)	Exit Velocity (mph)	Hard Hit %	Barrels/PA (%)	Barrels	K %	BB %	wOBA	xwOBA
Jonathan Aranda	11.0	91.9	48.5	11.2	16.0	22.4	8.4	0.320	0.362
MLB Average	13.4	88.6	38.3	5.1	20.7	23.1	8.0	0.303	0.306

To evaluate Aranda's performance more closely, I compared his 2024 metrics to MLB averages among hitters with at least 100 plate appearances. Aranda outperformed the league average in: exit velocity, hard hit rate, barrels/PA%, strikeout rate, walk rate, wOBA, and xwOBA. The only categories he was worse than league average was launch angle and barrels, but his launch angle is not significantly lower than the league average and more barrels will come with more plate appearances.

Jonathan Aranda: 2024 vs 2025 Performance

Metric	2024	2025 (as of 6/16)
Plate Appearances	143	257
Launch Angle (°)	11.0	13.4
Exit Velocity (mph)	91.9	92.5
Hard Hit %	48.5	54.4
Barrels/PA (%)	11.2	6.7
Barrels	16.0	17.0
K %	22.4	23.7
BB %	8.4	11.1
wOBA	0.320	0.395
xwOBA	0.362	0.400

To assess whether Aranda's 2024 metrics have translated into further success this season, I compared his 2024 numbers to his 2025 numbers as of June 16. This season, Aranda has already surpassed his plate appearance total from last season. He has shown improvements in Launch Angle, exit velocity, hard hit %, walk rate, wOBA, and xwOBA. While he is not producing as many barrels as he did in the fewer plate appearances in 2024, his hard-hit rate is in the top 5% of MLB and average exit velocity is in the top 10%, per statcast. His wRC+ of 167 is in the top 10 in the league. These trends suggest Aranda is building off of what he did in 2024 and emerging as one of the best hitters in MLB.

Jerar Encarnacion

Using the regression model, Jerar Encarnacion ranked first in predicted xwOBA. In 119 plate appearances in 2024, Encarnacion was above the league average in exit velocity, hard hit rate, barrels per plate appearance percentage, and xWOBAB. He also hit 5 home runs, but his wOBAB was nearly 5% lower than his xwOBAB, suggesting some bad luck.

One key limitation was his launch angle, which was well below average. His ground ball rate was 48.8%, his flyball rate was 21.3, and his line drive rate was 28.8% . For comparison, Mike Trout’s career ground ball rate is 35.7%, flyball rate is 30.8% and line drive rate of 26.5. If he can adjust his swing to elevate the ball more consistently, and improve his plate discipline, Encarnacion has the potential to become a productive MLB hitter.

Jerar Encarnacion vs. MLB Average (2024, Min. 100 PA)										
Player	PA	Launch Angle (°)	Exit Velocity (mph)	Hard Hit %	Barrels/PA (%)	Barrels	K %	BB %	wOBAB	xwOBAB
Jerar Encarnacion	119	6.7	95.0	58.8	10.1	12.0	28.6	4.2	0.301	0.348
MLB Average	NA	13.4	88.6	38.3	5.1	20.7	23.1	8.0	0.303	0.306

Dominic Canzone

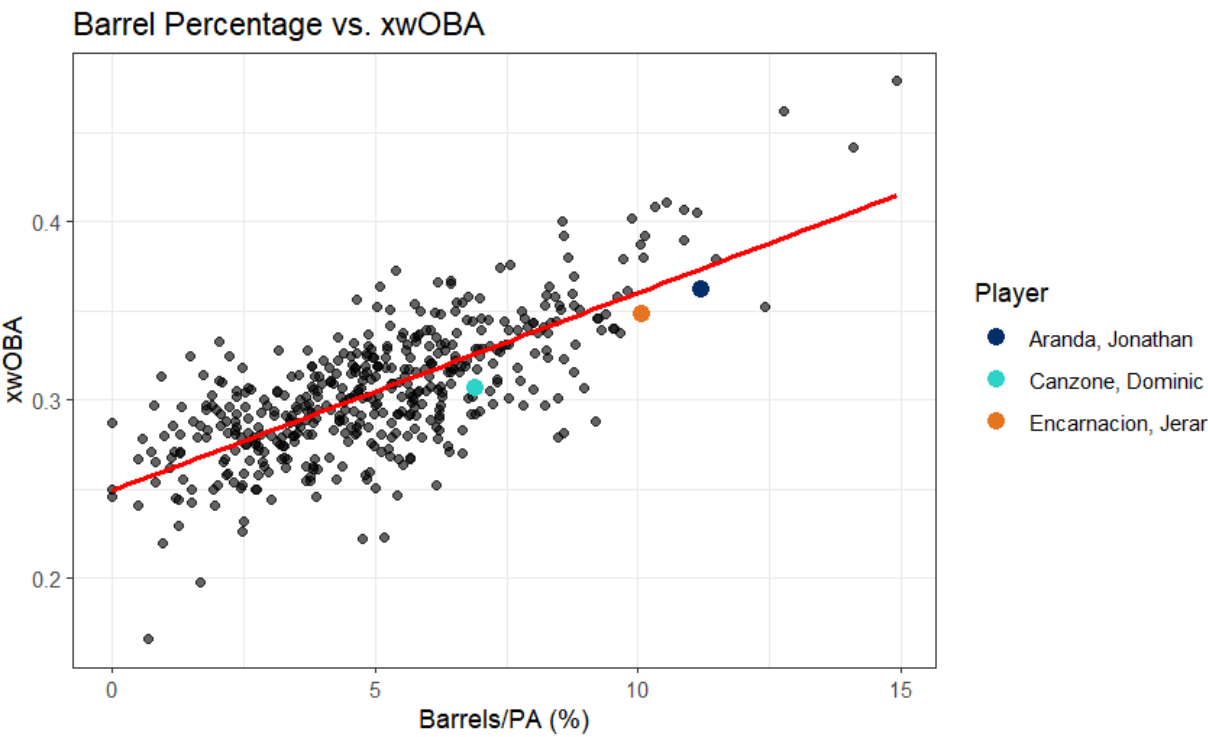
Dominic Canzone is another player that was identified by the model. According to the model, his predicted xwOBAB was 14th highest based on the plate appearance and age qualifications. Canzone hit 8 home runs in 188 plate appearances, and his hard hit rate was 6.1% above league average and a 1.3 mph higher average exit velocity. While his wOBAB was just .280, his xwOBAB was significantly higher at .307, suggesting he underperformed his expected results.

Looking at Canzone’s batted ball profile provides more context to his performance. He had a ground ball rate of 44.4%, a fly ball rate of 33.3%, and a line drive rate of 18.8%. This shows that his low line drive rate and relatively high ground ball rate may have limited his production.

Like Encarnacion, improving his launch angle could improve his power but his ability to hit the ball hard along with a solid walk rate give him a promising foundation moving forward.

Dominic Canzone vs. MLB Average (2024, Min. 100 PA)										
Player	PA	Launch Angle (°)	Exit Velocity (mph)	Hard Hit %	Barrels/PA (%)	Barrels	K %	BB %	wOBA	xwOBA
Dominic Canzone	188	9.1	89.9	44.4	6.9	13.0	28.2	9.6	0.280	0.307
MLB Average	NA	13.4	88.6	38.3	5.1	20.7	23.1	8.0	0.303	0.306

Scatterplot



This plot shows the relationship between the percentage of plate appearances that resulted in a barrel and the expected weighted on base average (xwOBA). This includes all 455 players from the 2024 MLB season that had at least 100 plate appearances. As shown, Aranda is positioned near the upper end of the plot, while Encarnacion is not far behind. Canzone appears further back, but still in a strong position among the rest of the players.

Conclusion

In conclusion, this analysis demonstrates how advanced metrics like barrel rate, hard hit percentage, and predicted xwOBA can help identify potential breakout candidates among younger players with limited playing time. By focusing on these advanced metrics rather than just traditional statistics, we can better evaluate a player's potential, especially when they have yet to establish a long MLB track record. Jonathan Aranda's success in 2025, along with a handful of other players highlighted by this model, showcase its effectiveness. Meanwhile, players like Jerar Encarnacion and Dominic Canzone, show encouraging signs in their underlying metrics that could lead to them having consistent MLB success with some adjustments. As the season progresses, it will be interesting to track the players in this model and assess the long-term value of this model.