Evaluating First-Round NBA Draft Picks: Bust or Success? DSC 405 (001) Web Scraping Project

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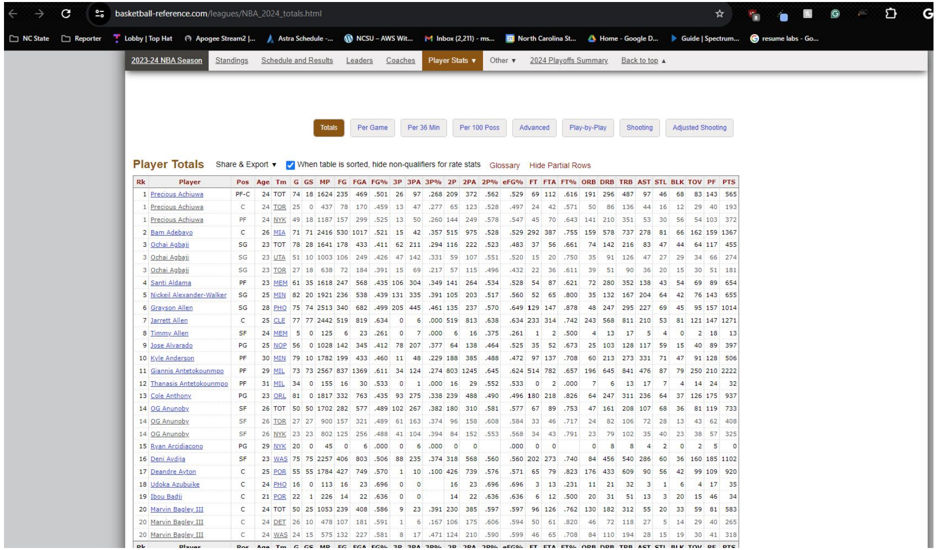
Project Objective & Problem Statement

- Every year, athletes join the NBA Draft, with a handful making it to the first round, which often leads to better salaries and recognition. These players are anticipated to perform exceptionally, but a significant number end up not meeting expectations.
- **Problem Statement:** This project seeks to quantify the success rate of NBA first-round draft picks by comparing their individual performance statistics to the league averages.
- **Problem Metrics**: Success is defined as stats equal to or greater than the average, while lower stats indicate a bust.

Data Source and Variables

- **Website**: Basketball Reference
- **Url**: https://www.basketball-reference.com/leagues/NBA_2024_totals.html
- **Limitations**: N/A
- **Explanatory Variable**: Statistics of the first-round picks, which include Points per Game, Rebounds per Game, Assists per Game, Steals per Game, and Turnovers per Game.
- **Response Variable**: Status of the first-round picks, which is determined based on whether their statistics are greater than equal to, or lower than the league's first-round draft picks averages. This status is categorized as either 'successful' or 'bust'.
- **Information Status:** HTML



Rk	Player	Pos	Age	Tm	G	GS	MP	FG	FGA	FG%	3P	3PA	3P%	2P	2PA	2P%	eFG%	FT	FTA	FT%	ORB	DRB	TRB	AST	STL	BLK	TOV	PF	PTS
1	Precious Achiuwa	PF-C	24	TOT	74	18	1624	235	469	.501	26	97	.268	209	372	.562	.529	69	112	.616	191	296	487	97	46	68	83	143	565
1	Precious Achiuwa	C	24	TOR	25	0	437	78	170	.459	13	47	.277	65	123	.528	.497	24	42	.571	50	86	136	44	16	12	29	40	193
1	Precious Achiuwa	PF	24	NYK	49	18	1187	157	299	.525	13	50	.260	144	249	.578	.547	45	70	.643	141	210	351	53	30	56	54	103	372
2	Bam Adebayo	C	26	MIA	71	71	2416	530	1017	.521	15	42	.357	515	975	.528	.529	292	387	.755	159	578	737	278	81	66	162	159	1367
3	Ochai Agbaji	SG	23	TOT	78	28	1641	178	433	.411	62	211	.294	116	222	.523	.483	37	56	.661	74	142	216	83	47	44	64	117	455
3	Ochai Agbaji	SG	23	UTA	51	10	1003	106	249	.426	47	142	.331	59	107	.551	.520	15	20	.750	35	91	126	47	27	29	34	66	274
3	Ochai Agbaji	SG	23	TOR	27	18	638	72	184	.391	15	69	.217	57	115	.496	.432	22	36	.611	39	51	90	36	20	15	30	51	181
4	Santi Aldama	PF	23	MEM	61	35	1618	247	568	.435	106	304	.349	141	264	.534	.528	54	87	.621	72	280	352	138	43	54	69	89	654
5	Nickeil Alexander-Walker	SG	25	MIN	82	20	1921	236	538	.439	131	335	.391	105	203	.517	.560	52	65	.800	35	132	167	204	64	42	76	143	655
6	Grayson Allen	SG	28	PHO	75	74	2513	340	682	.499	205	445	.461	135	237	.570	.649	129	147	.878	48	247	295	227	69	45	95	157	1014
7	Jarrett Allen	C	25	CLE	77	77	2442	519	819	.634	0	6	.000	519	813	.638	.634	233	314	.742	243	568	811	210	53	81	121	147	1271
8	Timmy Allen	SF	24	MEM	5	0	125	6	23	.261	0	7	.000	6	16	.375	.261	1	2	.500	4	13	17	5	4	0	2	18	13
9	Jose Alvarado	PG	25	NOP	56	0	1028	142	345	.412	78	207	.377	64	138	.464	.525	35	52	.673	25	103	128	117	59	15	40	89	397
10	Kyle Anderson	PF	30	MIN	79	10	1782	199	433	.460	11	48	.229	188	385	.488	.472	97	137	.708	60	213	273	331	71	47	91	128	506
11	Giannis Antetokounmpo	PF	29	MIL	73	73	2567	837	1369	.611	34	124	.274	803	1245	.645	.624	514	782	.657	196	645	841	476	87	79	250	210	2222
12	Thanasis Antetokounmpo	PF	31	MIL	34	0	155	16	30	.533	0	1	.000	16	29	.552	.533	0	2	.000	7	6	13	17	7	4	14	24	32
13	Cole Anthony	PG	23	ORL	81	0	1817	332	763	.435	93	275	.338	239	488	.490	.496	180	218	.826	64	247	311	236	64	37	126	175	937
14	OG Anunoby	SF	26	TOT	50	50	1702	282	577	.489	102	267	.382	180	310	.581	.577	67	89	.753	47	161	208	107	68	36	81	119	733
14	OG Anunoby	SF	26	TOR	27	27	900	157	321	.489	61	163	.374	96	158	.608	.584	33	46	.717	24	82	106	72	28	13	43	62	408
14	OG Anunoby	SF	26	NYK	23	23	802	125	256	.488	41	104	.394	84	152	.553	.568	34	43	.791	23	79	102	35	40	23	38	57	325
15	Ryan Arcidiacono	PG	29	NYK	20	0	45	0	6	.000	0	6	.000	0	0		.000	0	0		0	8	8	4	2	0	2	5	0
16	Deni Avdija	SF	23	WAS	75	75	2257	406	803	.506	88	235	.374	318	568	.560	.560	202	273	.740	84	456	540	286	60	36	160	185	1102
17	Deandre Ayton	C	25	POR	55	55	1784	427	749	.570	1	10	.100	426	739	.576	.571	65	79	.823	176	433	609	90	56	42	99	109	920
18	Udoka Azubuike	C	24	PHO	16	0	113	16	23	.696	0	0		16	23	.696	.696	3	13	.231	11	21	32	3	1	6	4	17	35
19	Ibou Badji	C	21	POR	22	1	226	14	22	.636	0	0		14	22	.636	.636	6	12	.500	20	31	51	13	3	20	15	46	34
20	Marvin Bagley III	C	24	TOT	50	25	1053	239	408	.586	9	23	.391	230	385	.597	.597	96	126	.762	130	182	312	55	20	33	59	81	583
20	Marvin Bagley III	C	24	DET	26	10	478	107	181	.591	1	6	.167	106	175	.606	.594	50	61	.820	46	72	118	27	5	14	29	40	265
20	Marvin Bagley III	C	24	WAS	24	15	575	132	227	.581	8	17	.471	124	210	.590	.599	46	65	.708	84	110	194	28	15	19	30	41	318

Data Moves

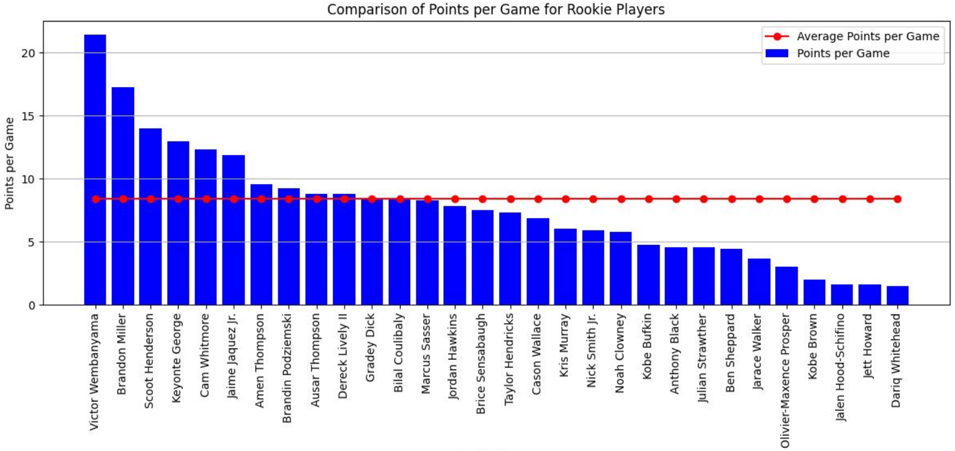
1. Import necessary libraries and load the website’s HTML data. This is the initial setup where you bring in the tools you need and the data you’ll be working with.
2. Transform the HTML data into a usable data frame. This involves finding the appropriate HTML tags and classes that contain the data you’re interested in, and converting that data into a structured format.
3. Select the columns needed for analysis. The columns “Player”, “G”, “PTS”, “TRB”, “AST”, “STL”, and "TOV”.
4. Combine rows with the same player names. This step consolidates data for each player if they appear in multiple rows.
5. Calculate per-game statistics. Using the columns “PTS”, “TRB”, “AST”, “STL”, and "TOV”, create new columns ‘Points per Game’, ‘Rebounds per Game’, ‘Assists per Game’,’ Steals per Game’, ‘Turnovers per Game’ by dividing the values into these columns by the number of games played (‘G’ column).
6. Calculate average statistics. Create new columns ‘Average Points per Game’, ‘Average Rebounds per Game’,’ Average Assists per Game’, ‘Average Steals per Game’, and ‘Average Turnovers per Game’ by finding the means of the ‘Points per Game’, ‘Rebounds per Game’, ‘Assists per Game’,’ Steals per Game’, ‘Turnovers per Game’ columns.
7. Visualize the data. Create bar charts comparing the rookie players and their ‘Points per Game’, ‘Rebounds per Game’, ‘Assists per Game’,’ Steals per Game’, and ‘Turnovers per Game’.
8. Calculate and visualize differences. Calculate the difference between the players’ per-game statistics and the average statistics, and plot these differences on a bar chart. This will give you a visual representation of how each player compares to the average.

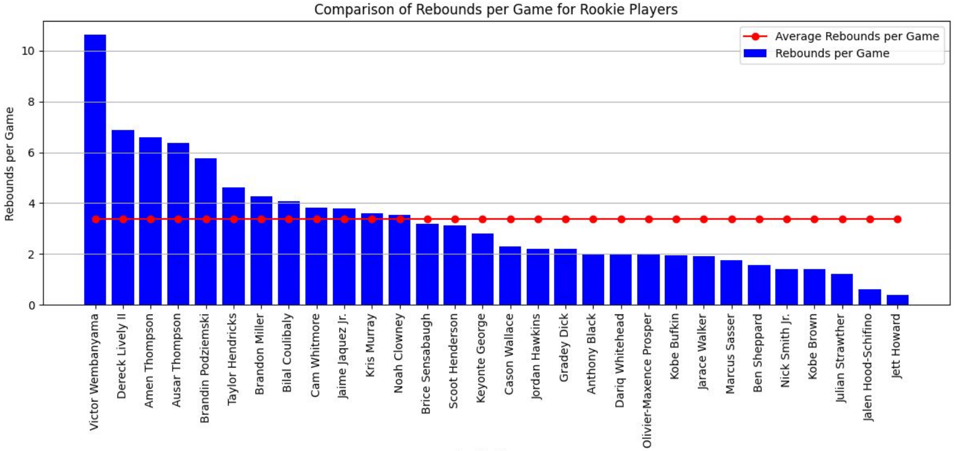
Final DataFrame for Analysis/Visualization

Player	G	Points per Game	Rebounds per Game	Assists per Game	Steals per Game	Turnovers per Game
Amen Thompson	62	9.548387096774194	6.596774193548387	2.629032258064516	1.2580645161290323	1.4516129032258065
Anthony Black	69	4.579710144927536	2.0144927536231885	1.318840579710145	0.5072463768115942	0.8115942028985508
Ausar Thompson	63	8.825396825396826	6.380952380952381	1.9047619047619047	1.0793650793650793	1.3333333333333333
Ben Sheppard	57	4.421052631578948	1.5614035087719298	0.9298245614035088	0.5789473684210527	0.2631578947368421
Bilal Coulibaly	63	8.444444444444445	4.063492063492063	1.746031746031746	0.9047619047619048	1.380952380952381
Brandin Podziemski	74	9.216216216216216	5.77027027	3.689189189189189	0.8243243243243243	1.1891891891891893
Brandon Miller	74	17.283783783783782	4.256756756756757	2.364864864864865	0.8918918918918919	1.7837837837837838
Brice Sensabaugh	32	7.53125	3.1875	1.71875	0.40625	1.46875
Cam Whitmore	47	12.319148936170214	3.8297872340425534	0.7021276595744681	0.6382978723404256	0.9787234042553191
Cason Wallace	82	6.841463414634147	2.2804878048780486	1.4634146341463414	0.926829268	0.5487804878048781
Dariq Whitehead	2	1.5	2	1.5	0	0
Dereck Lively II	55	8.781818181818181	6.872727272727273	1.0909090909090908	0.6545454545454545	0.9090909090909091
Gradey Dick	60	8.5	2.2	1.1333333333333333	0.5666666666666667	0.8333333333333334
Jaime Jaquez Jr.	75	11.853333333333333	3.8	2.6	1.0266666666666666	1.4666666666666666
Jalen Hood-Schifino	21	1.619047619047619	0.6190476190476191	0.38095238095238093	0.14285714285714285	0.42857142857142855
Jarace Walker	33	3.6363636363636362	1.9090909090909092	1.2121212121212122	0.45454545454545453	0.5151515151515151
Jett Howard	18	1.6111111111111112	0.3888888888888889	0.3333333333333333	0.1111111111111111	0.16666666666666666
Jordan Hawkins	67	7.820895522	2.208955223880597	1.044776119402985	0.2835820895522388	0.5970149253731343
Julian Strawther	50	4.54	1.22	0.94	0.34	0.46
Keyonte George	75	12.986666666666666	2.8133333333333335	4.426666666666667	0.48	2.506666666666667
Kobe Brown	44	2.022727272727273	1.4090909090909092	0.5681818181818182	0.2727272727272727	0.20454545454545456
Kobe Bufkin	17	4.764705882352941	1.9411764705882353	1.588235294117647	0.4117647058823529	0.5882352941176471
Kris Murray	62	6.064516129032258	3.6129032258064515	1.2903225806451613	0.8548387096774194	0.8870967741935484
Marcus Sasser	71	8.253521126760564	1.7605633802816902	3.323943661971831	0.6197183098591549	1.267605633802817
Nick Smith Jr.	51	5.921568627450981	1.411764705882353	1.1568627450980393	0.19607843137254902	0.7647058823529411
Noah Clowney	23	5.782608695652174	3.5217391304347827	0.782608696	0.34782608695652173	0.6521739130434783
Olivier-Maxence Prospe	40	3.025	1.975	0.55	0.175	0.2
Scoot Henderson	62	14	3.129032258064516	5.419354838709677	0.7741935483870968	3.4193548387096775
Taylor Hendricks	40	7.3	4.625	0.8	0.7	0.675
Victor Wembanyama	71	21.43661971830986	10.633802816901408	3.859154929577465	1.2394366197183098	3.6619718309859155

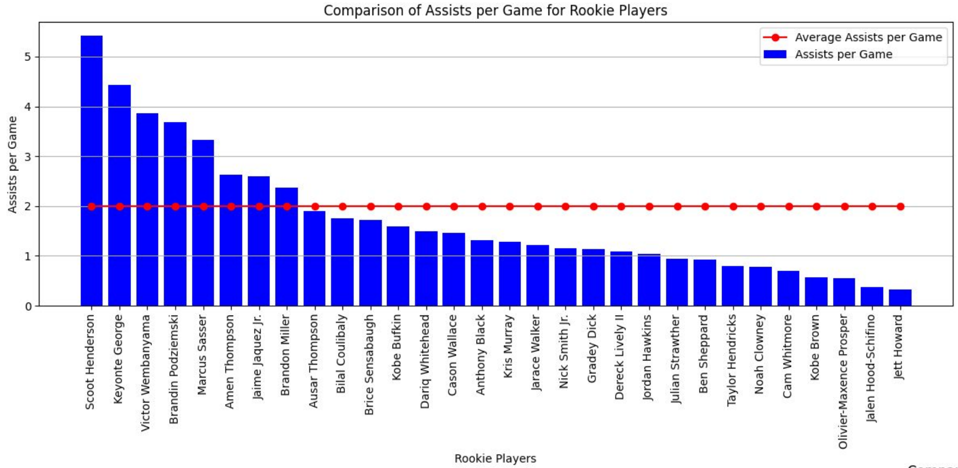
Player	Average Points per Game	Average Rebounds per Game	Average Assists per Game	Average Steals per Game	Average Turnovers per Game
Amen Thompson	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937
Anthony Black	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937
Ausar Thompson	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937
Ben Sheppard	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937
Bilal Coulibaly	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937
Brandin Podziemski	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937
Brandon Miller	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937
Brice Sensabaugh	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937
Cam Whitmore	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937
Cason Wallace	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937
Dariq Whitehead	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937
Dereck Lively II	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937
Gradey Dick	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937
Jaime Jaquez Jr.	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937
Jalen Hood-Schifino	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937
Jarace Walker	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937
Jett Howard	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937
Jordan Hawkins	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937
Julian Strawther	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937
Keyonte George	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937
Kobe Brown	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937
Kobe Bufkin	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937
Kris Murray	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937
Marcus Sasser	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937
Nick Smith Jr.	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937
Noah Clowney	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937
Olivier-Maxence Prospe	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937
Scoot Henderson	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937
Taylor Hendricks	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937
Victor Wembanyama	8.422299784791328	3.3747019906679503	2.0012952406136204	0.590349783	0.981565610251937

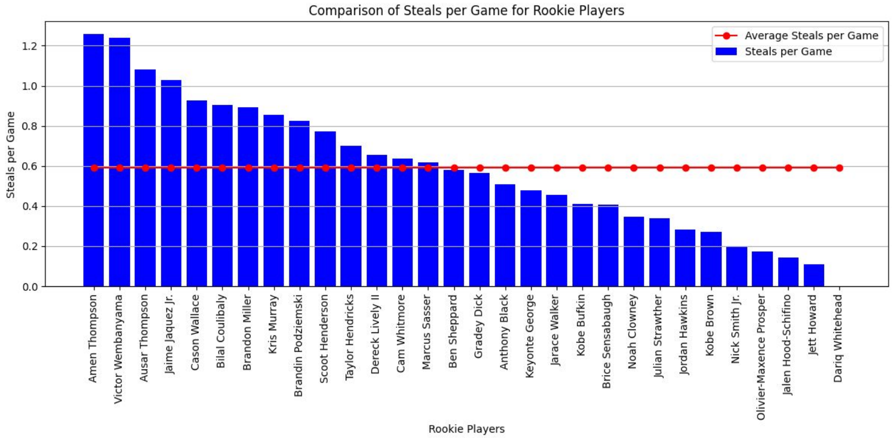
Findings/Visualizations

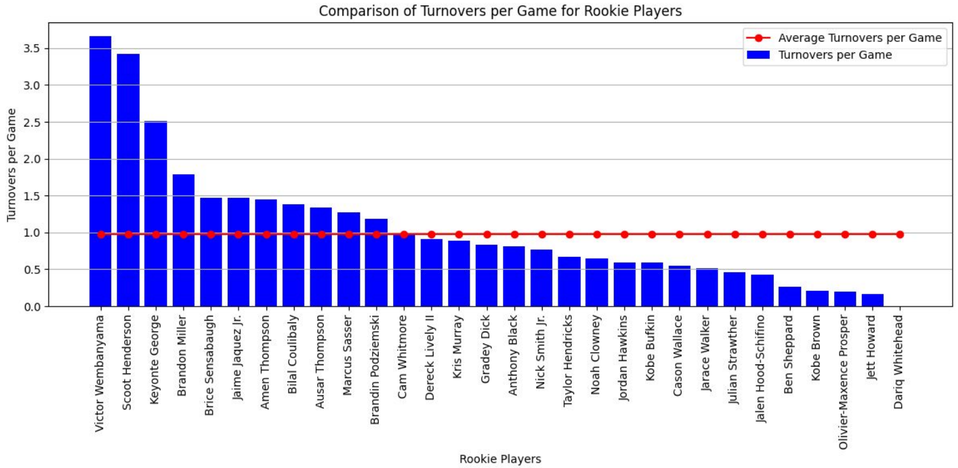




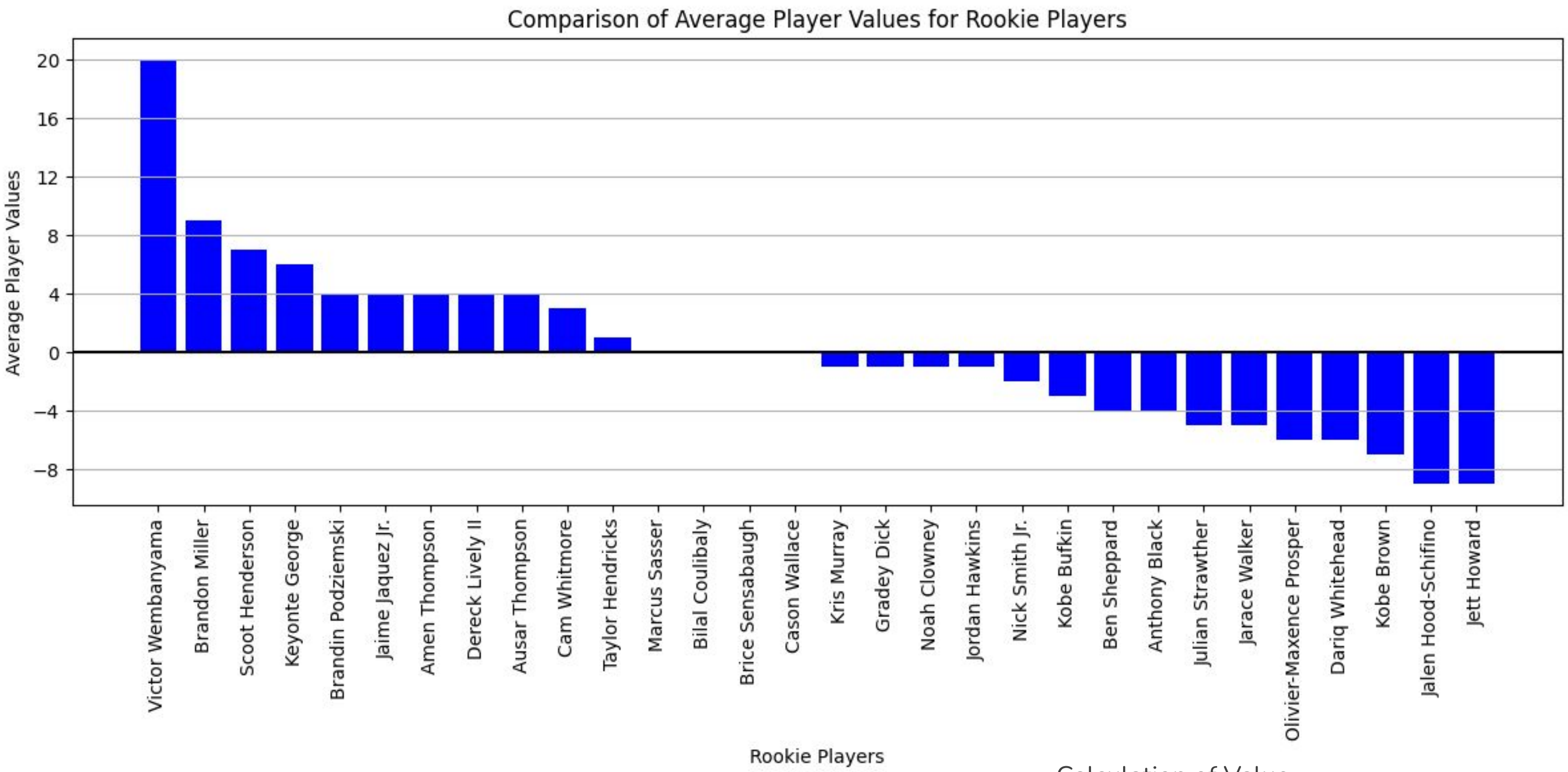
Comparison of Points & Rebounds Per Game for Rookie Players







Comparison of Assists, Steals, & Turnovers per Game for Rookie Players



Comparison of Average Player Values for Rookie Players

Calculation of Value

- Add: Difference of Individual Player Points, Assists, Steals, & Rebounds from League Average
- Subtract: Difference of Individual Player Turnovers from League Average

Findings

Success (all playing at a level equal or above the league average according to our parameters): Victor Wembayama, Brandon Miller, Scoot Henderson, Keyonte George, Brandin Podziemski, Jamie Jaquez Jr., Amen Thompson, Dereck Lively II, Ausar Thompson, Taylor Hendricks, Marcus Sasser, Billy Coulibaly, and Brice Sensabaugh.

Bust (all playing at a level below the league average according to our parameters): Cason Wallace, Kris Murray, Gradey Dick, Noah Clowney, Nick Smith Jr., Kobe Bufkin, Ben Sheppard, Anthony Black, Julian Strawther, Jarace Walker, Oliver-Maxence Prosper, Dariq Whitehead, Kobe Brown, Jalen Hood-Schifino, and Jett Howard

Use Case of Research and Future Projects

Use Case of Research:

- **NBA Fans**: They can gain insights about the potential performance of their favorite team's rookies.
- **Sports Analysts**: They can use the data for in-depth analysis and predictions.
- **NBA Teams**: They can use the insights for strategic decision-making during drafts.
- **Fantasy League Players**: They can make informed decisions when picking players for their fantasy teams.
- **Sports Journalists**: They can use the data for articles and reports on player performance.
- **Sports Bettors**: They can use the information to make informed bets.

Future Projects:

- **Player Performance Prediction**: This project could use machine learning algorithms to predict future performance of players based on their current stats.
- **Team Strategy Analysis**: This project could analyze the data to help teams develop strategies for game play, player selection, and training.
- **Fantasy League Optimization**: This project could help fantasy league players to optimize their team selection based on player stats. It could also predict the performance of players in upcoming games.