NBA Player Peaks: Age, Role, and Performance Trends

By Arjun Talapatra

Introduction:

Roster construction in today's NBA is becoming increasingly data-driven. It is a widely held consensus that NBA players peak at around the age of 27. But does age 27 represent a universal apex—or does the answer change once we separate guards from bigs, volume from efficiency, and raw output from how a player actually scores? This would have several implications, as contract lengths, draft pick valuations, and even championship windows are routinely justified by predicting the age in which a player peaks.

To test all these questions, this study analyzes the entire 2022-23 regular season dataset (539 players) using a reproducible SQL → Tableau workflow. Four complementary lenses guide the investigation:

1. Box-score production – How do points, rebounds, assists, steals, and blocks per game evolve across four age cohorts (≤22, 23-25, 26-29, 30+)?
2. Positional context – Do guards, forwards, and bigs follow distinct aging curves in those same volume metrics?
3. Advanced impact metrics – How do efficiency indicators such as Box Plus Minus (BPM), True Shooting %, and Player Efficient Rating (PER) estimate peak relative to volume stats?
4. Shot-selection – Does aging shift a player's shot diet?

All computations are performed in SQLite with clear SQL scripts, charts were created using Tableau Public.

Data Description:

The dataset was obtained through Kaggle and titled "NBA Per Game and Advanced Stats (2022-23 Season)." Both csv files (nba_2022-23_all_stats.csv - renamed to "allstats" in SQLite and Tableau Public, and nba_per_game_processed.csv - renamed to "pergamestats") were used. From pergamestats, the following columns were used: Age, PTS, TRB, AST, BLK, STL, MP,

GP, Position, FGA, 3PA, 2PA, FTA. From allstats, the following columns were used: TS%, eFG%, PER, WS, BPM, VORP, DWS, DBPM.

Below is an sql query that shows a basic description of the data.

```sql
--Summary statistics of data
SELECT avg(Age),COUNT(field1) AS numplayers
FROM allstats
```

	avg(Age)	numplayers
1	25.7272727272727	539

In the 2022-23 season, there were 539 players in the NBA with an average age of approximately 25.7.

I also grouped the player ages into bins separating players who were 22 or younger, 23-25, 26-29, and 30 and above. These ranges were created to make the number of players in each bin as close to each other as possible. There were 124 players who were 22 or younger, 169 players between the ages of 23 and 25, 129 players between 26 and 29, and 109 players who were 30+. I will compare these bins when conducting my statistical analysis. The following pie chart depicts the above:
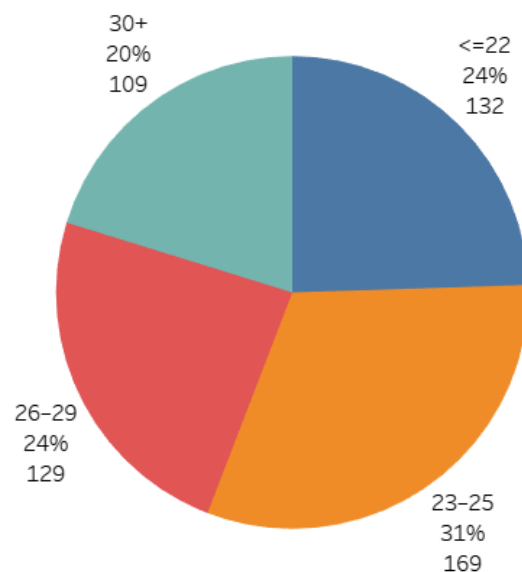
1. Box Score Statistics:

Methodology:
Aggregation – AVG(PTS)…AVG(BLK) calculated in SQLite for every (age_group, position_group) cell.
Ordering – CASE statements ensure logical age sorting.
The following is the SQL query used:

```sql
1   SELECT
2     CASE
3       WHEN Age <= 22 THEN '<=22'
4       WHEN Age BETWEEN 23 AND 25 THEN '23-25'
5       WHEN Age BETWEEN 26 AND 29 THEN '26-29'
6       WHEN Age >= 30 THEN '30+'
7     END AS age_range,
8     COUNT(*) AS num_players,
9     AVG(Age) AS avg_age,
10    AVG(PTS) AS avg_pts,
11    AVG(TRB) AS avg_trb,
12    AVG(AST) AS avg_ast,
13    AVG(BLK) AS avg_blk,
14    AVG(STL) AS avg_stl,
15    AVG(MP) AS avg_mp,
16    AVG(GP) AS avg_gp
17  FROM pergamestats
18  WHERE Age IS NOT NULL
19  GROUP BY age_range
20  ORDER BY
21    CASE
22      WHEN age_range = '<=22' THEN 1
23      WHEN age_range = '23-25' THEN 2
24      WHEN age_range = '26-29' THEN 3
25      WHEN age_range = '30+' THEN 4
26    END;
```

	age_range	num_players	avg_age	avg_pts	avg_trb	avg_ast	avg_blk	avg_stl	avg_mp	avg_gp
1	<=22	132	20.9166666666667	7.83030303030303	3.17045454545455	1.67954545454545	0.363636363636364	0.537121212121212	17.7409090909091	46.1969696969697
2	23-25	169	23.9289940828402	8.76508875739645	3.42721893491124	1.84497041420118	0.388757396449704	0.591715976331361	19.0005917159763	45.1479289940828
3	26-29	129	27.3023255813953	10.2589147286822	3.98062015503876	2.3906976744186	0.39922480620155	0.70077519379845	21.5875968992248	50.9922480620155
4	30+	109	32.4770642201835	9.89082568807339	3.65596330275229	2.50642201834862	0.375229357798165	0.61743119266055	21.4018348623853	51.2660550458716

Visualization – Five bar charts show the relationship between age and points per game, rebounds per game, assists per game, steals per game, blocks per game:

Age vs Points Per Game

Age vs Total Rebounds Per Game

Age vs Assists Per Game

Age vs Steals Per Game

Age vs Blocks Per Game
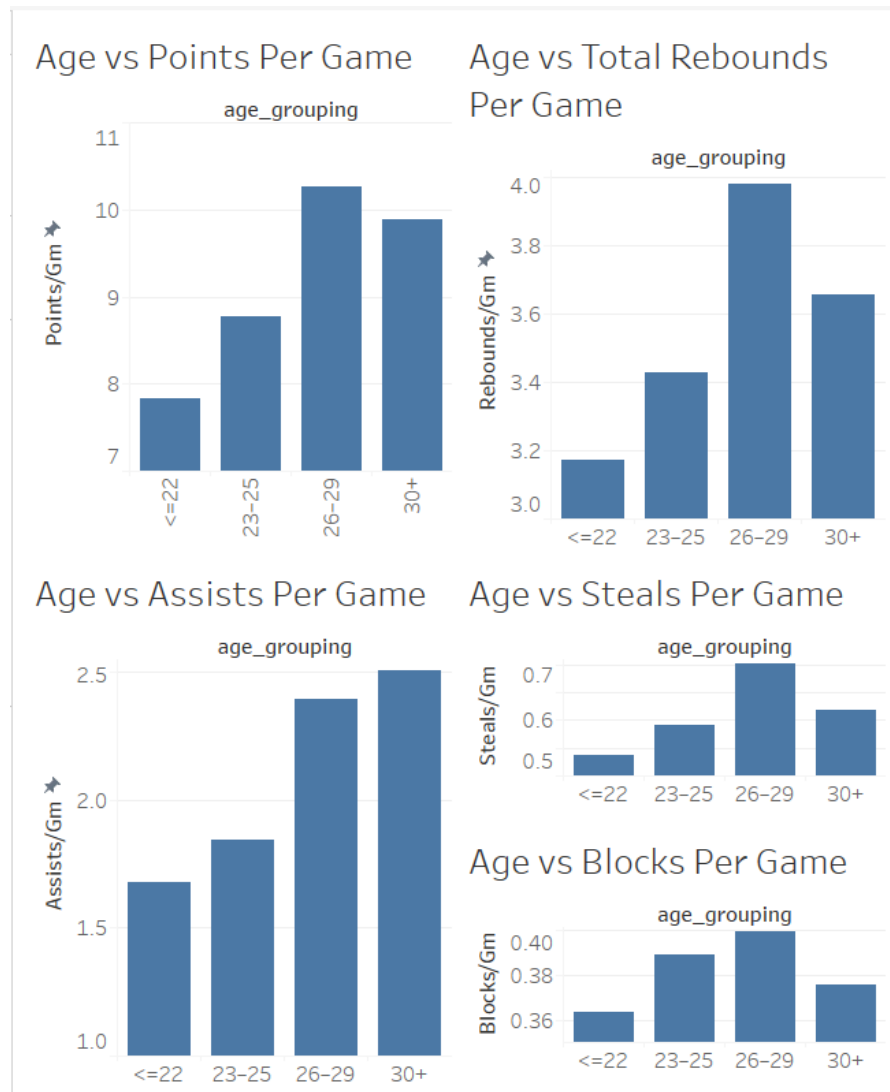
Results:
- Points/Game: Peak at 26-29. Rises about linearly up to 26-29 with approximately a 31% increase from <=22 to 26-29. Then drops 4% from 26-29 to 30+.
- Rebounds/Game: Peak at 26-29. A 26% increase from <=22 to 26-29 with a notable 16% jump from 23-25 to 26-29. Drops 8% from 26-29 to 30+.
- Assists/Game: Rises every year with a peak at 30+. Biggest jump was from 23-25 to 26-29, with a 30% increase.
- Blocks/Game: Peak at 26-29 with a 10% increase from <=22 to 26-29. A 6% dropoff from 26-29 to 30+.
- Steals/Game: Peak at 26-29 with 30% increase from <=22 to 26-29. An 11% dropoff from 26-29 to 30+.
- Minutes/Game: Peak at 26-29. Rises about linearly up to 26-29 with 22% increase from <=22 to 26-29. Drops a statistically insignificant amount between 26-29 and 30+ (<1%).

Analysis:

Between the time players enter the league (typically <=22) and their late 20s, they experience consistent growth in all metrics. This reflects physical development, increasing experience, expanded roles, and increased playing time. Once players enter their 30s, there is a noticeable decline in physically demanding stats such as rebounds, blocks, and steals. There is also a slight decline in scoring which can also be attributed to diminished athleticism. However, playmaking and basketball iq appears to continue improving into players' 30s which is seen by the continuing increase in assists per game. This suggests that players at around the age of 30 shift into a more cerebral, facilitator role. Players such as Lebron James and Chris Paul are notorious examples of this.

2. **Box Score Statistics Separated by Position**

To explore whether aging curves vary by position, player roles were grouped into three categories:

- Guards – Players listed as PG, SG, or PG/SG hybrids
- Forwards – SF, PF, or hybrids like SF/PF
- Bigs – Traditional centers and forward-centers (C, PF/C, etc.)

Each player's age was binned into the same four age ranges: ≤22, 23–25, 26–29, and 30+. Average box score metrics—points, rebounds, assists, steals, and blocks—were then calculated for each (position, age) cell using SQL. The output was visualized using grouped bar charts in Tableau.

SQL query:

```sql
SELECT
  CASE
    WHEN Age <= 22 THEN '<=22'
    WHEN Age BETWEEN 23 AND 25 THEN '23-25'
    WHEN Age BETWEEN 26 AND 29 THEN '26-29'
    WHEN Age >= 30 THEN '30+'
  END AS age_range,

  CASE
    WHEN Position IN ('PG', 'SG', 'SG-PG', 'PG-SG') THEN 'Guard'
    WHEN Position IN ('SF', 'PF', 'PF-SF', 'SF-PF') THEN 'Forward'
    WHEN Position IN ('C', 'PF-C', 'C-PF') THEN 'Big'
    ELSE NULL
  END AS position_group,

  COUNT(*) AS num_players,
  AVG(PTS) AS avg_pts,
  AVG(TRB) AS avg_trb,
  AVG(AST) AS avg_ast,
  AVG(STL) AS avg_stl,
  AVG(BLK) AS avg_blk

FROM pergamestats
WHERE Age IS NOT NULL
  AND Position IN (
    'PG', 'SG', 'SG-PG', 'PG-SG',
    'SF', 'PF', 'PF-SF', 'SF-PF',
    'C', 'PF-C', 'C-PF'
  )

GROUP BY age_range, position_group

ORDER BY
  CASE position_group
    WHEN 'Guard' THEN 1
    WHEN 'Forward' THEN 2
    WHEN 'Big' THEN 3
  END,
  CASE
    WHEN age_range = '<=22' THEN 1
    WHEN age_range = '23-25' THEN 2
    WHEN age_range = '26-29' THEN 3
    WHEN age_range = '30+' THEN 4
  END;
```

	age_range	position_group	num_players	avg_pts	avg_trb	avg_ast	avg_stl	avg_blk
1	<=22	Guard	63	8.24285714285714	2.37301587301587	2.11904761904762	0.573015873015873	0.206349206349206
2	23-25	Guard	69	9.49710144927536	2.4768115942029	2.75942028985507	0.697101449275362	0.226086956521739
3	26-29	Guard	46	11.2804347826087	2.87826086956522	3.40217391304348	0.873913043478261	0.265217391304348
4	30+	Guard	43	10.4581395348837	2.76511627906977	3.46046511627907	0.727906976744186	0.246511627906977
5	<=22	Forward	48	7.89791666666667	3.44791666666667	1.41875	0.520833333333333	0.38125
6	23-25	Forward	62	8.44354838709677	3.38870967741935	1.33709677419355	0.545161290322581	0.325806451612903
7	26-29	Forward	56	9.1375	3.825	1.76964285714286	0.625	0.321428571428571
8	30+	Forward	41	10.9634146341463	3.93170731707317	2.27560975609756	0.65609756097561	0.368292682926829
9	<=22	Big	21	6.43809523809524	4.92857142857143	0.957142857142857	0.466666666666667	0.795238095238095
10	23-25	Big	37	8.06486486486486	5.3027027027027	1.02162162162162	0.456756756756757	0.794594594594595
11	26-29	Big	26	10.4884615384615	6.25	1.90384615384615	0.542307692307692	0.792307692307692
12	30+	Big	25	7.156	4.736	1.244	0.364	0.608

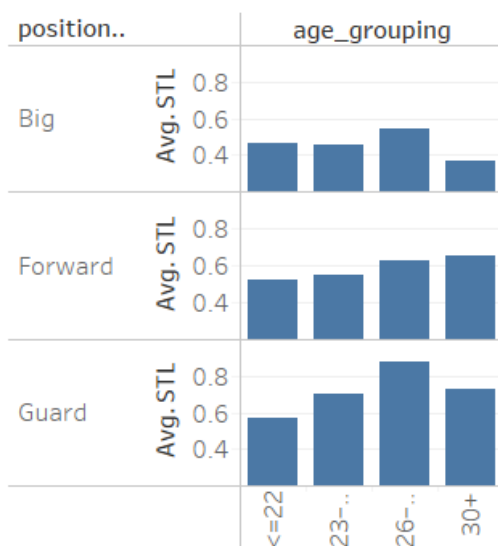*Visualization:*

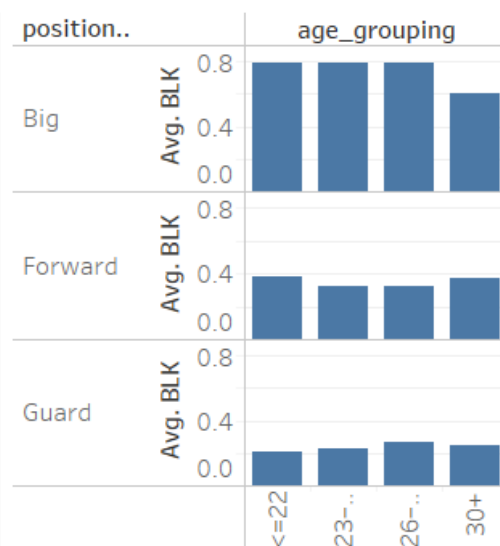## Age vs Points Per Game

Age vs Assists Per Game
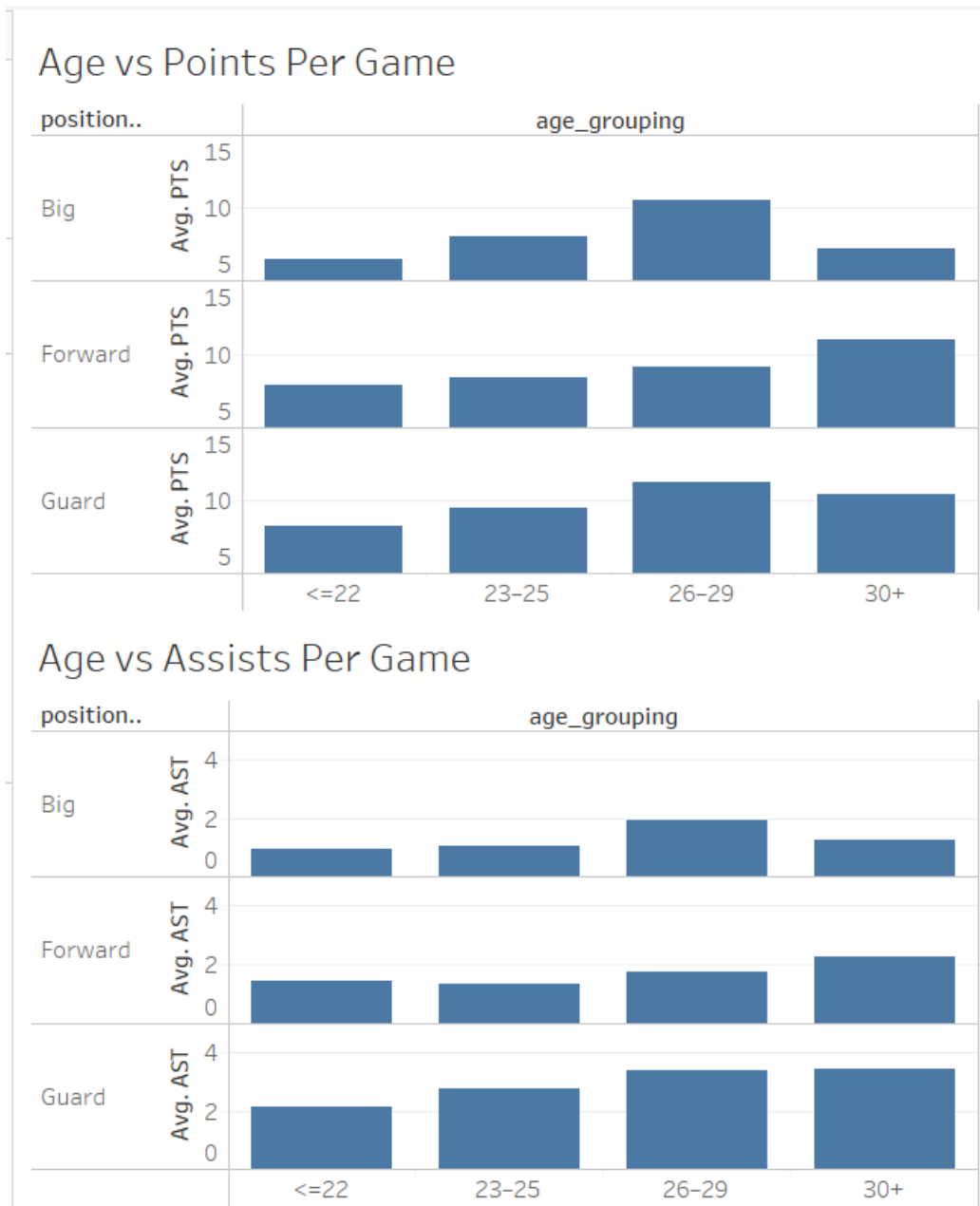
Age vs Total Rebounds Per Game
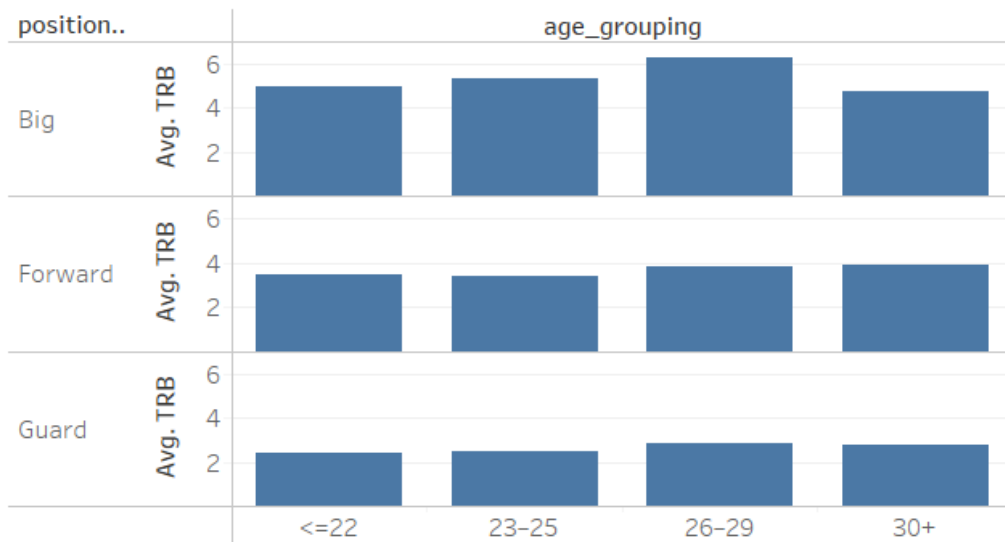
Age vs Steals Per Game

Age vs Blocks Per Game

Results:

Guards:

- Tend to peak in scoring in their late 20s, then 7% drop off from peak in 30s.
- Rebounds: Minimal difference with age—guards generally don't contribute heavily to rebounding.
- Assists: Peak at 30+: suggests experience and IQ at peak at this age for guards.
- Steals: Peak at 26-29 but still effective at 30+.
- Blocks: Minimal at all ages but peak at 26-29.

- These are mostly in line with expectations based on general trends from the previous chapter.

Forwards:
- Points, rebounds, assists, and steals all reach peak at 30+.
- This is notable as it defies general trends and suggests that forwards peak later in age compared to guards and bigs.
- A possible explanation for this is that forwards have the most role versatility as they are the most positionally fluid. Guards typically rely heavily on speed and agility, which declines very quickly as players age, while bigs face constant pounding in the paint which can wear down the body. Forwards typically have the size to not rely entirely on athleticism like guards do while not punishing their body the same way bigs do.

Bigs:
- Points, assists, rebounds, steals all peak at 26-29, then sharply decline at 30+.
- Blocks remain steady from <=22 to 26-29, then sharply decline at 30+.
- A possible explanation for this could be the chronic wear having as physical play style has on the body. Bigs are also the least likely to have a skill-based game to fall back on, so their playing time often reallocates to younger, faster players. This is especially pronounced in today's fast-paced, perimeter-oriented NBA.

3. Advanced Statistics

In this part, we will analyze how efficiency and impact metrics beyond box scores are affected by age. These are statistics that adjust for pace, possessions, teammates, opponents, and role size and are calculated using a variety of complex formulas. Studying this gives front-offices the clearest window into:
- When players add maximum on-court value
- Which skills age well (shooting, decision-making) vs. poorly (shot-creation burst, vertical rim protection)

Definitions of Advanced Statistics:
- TS%: Best indicator for Overall scoring efficiency that weighs 2-pointers, 3-pointers, and free throws into a single number.
- eFG %: Captures scoring efficiency while ignoring free throws.
- PER: "Per-minute productivity" blended into one number; favors high-usage stat-stuffers.
- WS: Measures cumulative wins contributed.
- BPM: Regression model that calculates how many points better/worse is a lineup per 100 possessions with this player?
- VORP: Measures impact above a replacement-level player.
- DWS: Measures Cumulative team-context defensive value.
- DBPM: Per-100 defensive impact independent of minutes played.

SQL Query:

```
1       SELECT *
2    FROM (
3         -- Part 1: By Position Group
4         SELECT
5           CASE
6               WHEN Age <= 22 THEN '<=22'
7               WHEN Age BETWEEN 23 AND 25 THEN '23-25'
8               WHEN Age BETWEEN 26 AND 29 THEN '26-29'
9               WHEN Age >= 30 THEN '30+'
10          END AS age_group,
11
12          CASE
13              WHEN Position IN ('PG', 'SG', 'PG-SG', 'SG-PG') THEN 'Guard'
14              WHEN Position IN ('SF', 'PF', 'PF-SF', 'SF-PF') THEN 'Forward'
15              WHEN Position IN ('C', 'PF-C', 'C-PF') THEN 'Big'
16          END AS position_group,
17
18          COUNT(*) AS num_players,
19          ROUND(AVG("TS%"), 3) AS ts,
20          ROUND(AVG("eFG%"), 3) AS efg,
21          ROUND(AVG(PER), 2) AS per,
22          ROUND(AVG(WS), 2) AS ws,
23          ROUND(AVG(BPM), 2) AS bpm,
24          ROUND(AVG(VORP), 2) AS vorp,
25          ROUND(AVG(DWS), 2) AS dws,
26          ROUND(AVG(DBPM), 2) AS dbpm
27
28      FROM allstats
29      WHERE Age IS NOT NULL
30        AND Position IN (
31          'PG', 'SG', 'PG-SG', 'SG-PG',
32          'SF', 'PF', 'PF-SF', 'SF-PF',
33          'C', 'PF-C', 'C-PF'
34        )
35      GROUP BY age_group, position_group
36
37      UNION ALL
38
```
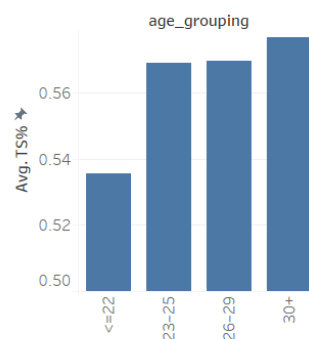
```sql
    -- Part 2: Totals (no position breakdown)
    SELECT
      CASE
        WHEN Age <= 22 THEN '<=22'
        WHEN Age BETWEEN 23 AND 25 THEN '23-25'
        WHEN Age BETWEEN 26 AND 29 THEN '26-29'
        WHEN Age >= 30 THEN '30+'
      END AS age_group,
      'Total' AS position_group,
      COUNT(*) AS num_players,
      ROUND(AVG("TS%"), 3) AS ts,
      ROUND(AVG("eFG%"), 3) AS efg,
      ROUND(AVG(PER), 2) AS per,
      ROUND(AVG(WS), 2) AS ws,
      ROUND(AVG(BPM), 2) AS bpm,
      ROUND(AVG(VORP), 2) AS vorp,
      ROUND(AVG(DWS), 2) AS dws,
      ROUND(AVG(DBPM), 2) AS dbpm

    FROM allstats
    WHERE Age IS NOT NULL
      AND Position IN (
        'PG', 'SG', 'PG-SG', 'SG-PG',
        'SF', 'PF', 'PF-SF', 'SF-PF',
        'C', 'PF-C', 'C-PF'
      )
    GROUP BY age_group
  ) AS final

  -- ⊟ Order: by Position first, then Age Group
  ORDER BY
    CASE position_group
      WHEN 'Guard' THEN 1
      WHEN 'Forward' THEN 2
      WHEN 'Big' THEN 3
      WHEN 'Total' THEN 4
    END,
    CASE age_group
      WHEN '<=22' THEN 1
      WHEN '23-25' THEN 2
      WHEN '26-29' THEN 3
      WHEN '30+' THEN 4
    END;
```
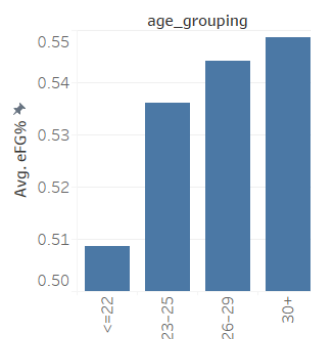
	age_group	position_group	num_players	ts	efg	per	ws	bpm	vorp	dws	dbpm
1	<=22	Guard	63	0.524	0.496	11.1	0.96	-3.55	0.03	0.66	-0.88
2	23-25	Guard	69	0.532	0.491	13.05	2.09	-1.4	0.6	0.91	-0.1
3	26-29	Guard	46	0.557	0.524	13.43	3.08	-0.56	0.87	1.45	0.09
4	30+	Guard	43	0.552	0.52	13.18	2.41	-0.62	0.78	1.07	-0.05
5	<=22	Forward	48	0.534	0.507	11.48	1.86	-2.85	0.21	1.09	-0.61
6	23-25	Forward	62	0.571	0.54	12.53	1.76	-1.46	0.24	0.95	-0.16
7	26-29	Forward	56	0.559	0.541	12.54	2.22	-1.61	0.54	1.2	-0.01
8	30+	Forward	41	0.578	0.547	13.41	3.04	-0.37	0.84	1.36	0.08
9	<=22	Big	21	0.575	0.548	14.93	2.29	-1.65	0.3	1.02	0.33
10	23-25	Big	37	0.634	0.614	17.3	3.23	-0.33	0.67	1.43	0.19
11	26-29	Big	26	0.614	0.587	18.01	4.32	0.74	1.53	1.58	0.71
12	30+	Big	25	0.618	0.6	14.69	2.84	-1.37	0.62	1.32	0.26
13	<=22	Total	132	0.536	0.509	11.85	1.5	-2.99	0.14	0.87	-0.59
14	23-25	Total	168	0.569	0.536	13.8	2.22	-1.19	0.48	1.04	-0.06
15	26-29	Total	128	0.57	0.544	13.97	2.96	-0.75	0.86	1.37	0.17
16	30+	Total	109	0.577	0.549	13.61	2.75	-0.7	0.77	1.24	0.07

Visualization:

Age vs TS%

age_grouping

Avg. TS% ✦

| | <=22 | 23-25 | 26-29 | 30+ |

Age vs EFG%

age_grouping

Avg. eFG% ✦

| | <=22 | 23-25 | 26-29 | 30+ |

Age vs PER

age_grouping

Avg. PER ✦

| | <=22 | 23-25 | 26-29 | 30+ |

Age vs WS

age_grouping

Avg. WS

| | <=22 | 23-25 | 26-29 | 30+ |

Age vs BPM

age_grouping

Avg. BPM

| | <=22 | 23-25 | 26-29 | 30+ |

Age vs VORP

age_grouping

Avg. Vorp

| | <=22 | 23-25 | 26-29 | 30+ |

Age vs DWS

age_grouping

Avg. DWS ✦

| | <=22 | 23-25 | 26-29 | 30+ |

Age vs DBPM

age_grouping

Avg. Dbpm ✦

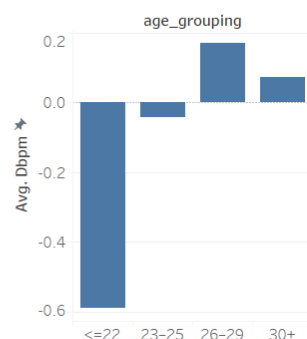| | <=22 | 23-25 | 26-29 | 30+ |
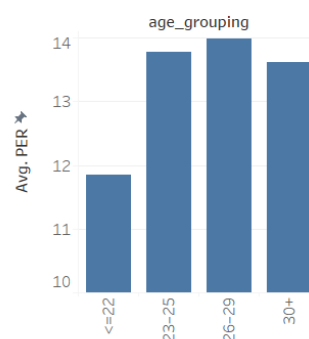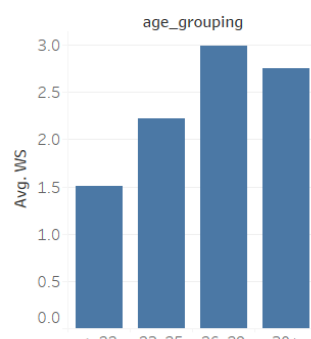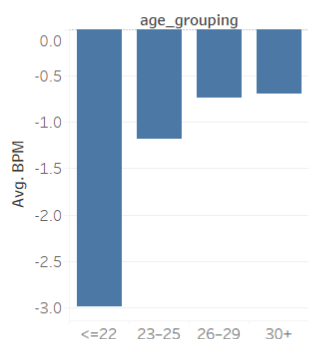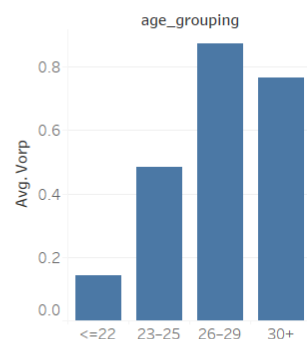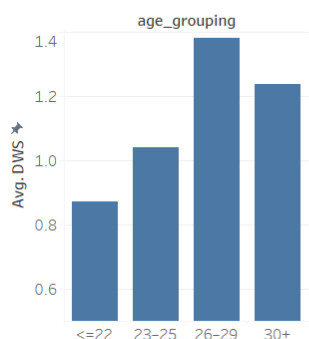
Analysis:

- For guards, both TS% and eFG% peaks at 26-29, then slightly declines at 30+. This indicates that guards show significant skill improvement scoring-wise into their late 20s, and into their 30s as their athleticism diminishes, they are still able to retain scoring efficiency through IQ and skill.
- For forwards and bigs, both TS% and eFG% peaks at 30+, indicating they continue to become more skilled scorers into their 30s.
- PER, WS, BPM, VORP all peak at 26-29 for guards and bigs, and 30+ for forwards. For bigs, the dropoff at 30+ was more significant than for guards. This is in line with expectations due to reasons explained in chapter 2 and suggests that these are the ages where players add the most overall "value" to a team all things considered.
- DWS and DBPM also peak at 26-29 for guards and bigs, and 30+ for forwards. This indicates that wings also peak defensively into their 30s. Bigs experienced the biggest drop off in defense and is likely a major factor towards why their effectiveness is significantly diminished into their 30s.

4. Shot Selection

In the previous chapter, we discovered that shooting efficiency tends to improve consistently until players' late 20s, then tends to plateau. In this chapter we will take a closer look at this and analyze where and how these shots originate.

Sql Query:

```sql
SELECT
  CASE
    WHEN Age <= 22 THEN '<=22'
    WHEN Age BETWEEN 23 AND 25 THEN '23-25'
    WHEN Age BETWEEN 26 AND 29 THEN '26-29'
    WHEN Age >= 30 THEN '30+'
  END AS age_group,

  COUNT(*) AS num_players,
  ROUND(AVG(FGA), 1) AS avg_fga,
  ROUND(AVG("3PA"), 1) AS avg_3pa,
  ROUND(AVG("2PA"), 1) AS avg_2pa,
  ROUND(AVG(FTA), 1) AS avg_fta

FROM pergamestats
WHERE Age IS NOT NULL
  AND FGA IS NOT NULL
  AND "3PA" IS NOT NULL
  AND "2PA" IS NOT NULL
  AND FTA IS NOT NULL

GROUP BY
  CASE
    WHEN Age <= 22 THEN '<=22'
    WHEN Age BETWEEN 23 AND 25 THEN '23-25'
    WHEN Age BETWEEN 26 AND 29 THEN '26-29'
    WHEN Age >= 30 THEN '30+'
  END

ORDER BY
  CASE
    WHEN Age <= 22 THEN 1
    WHEN Age BETWEEN 23 AND 25 THEN 2
    WHEN Age BETWEEN 26 AND 29 THEN 3
    WHEN Age >= 30 THEN 4
  END;
```
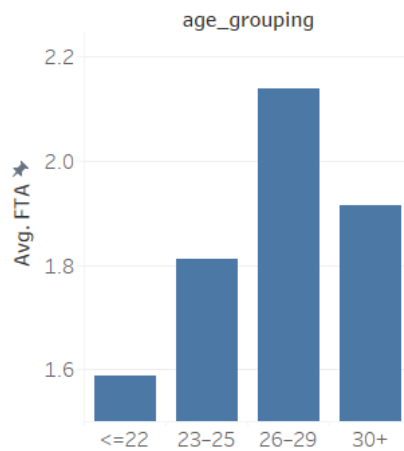
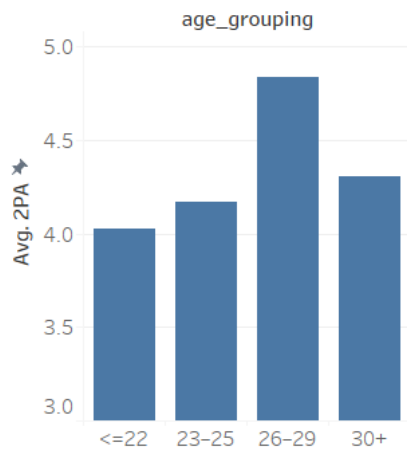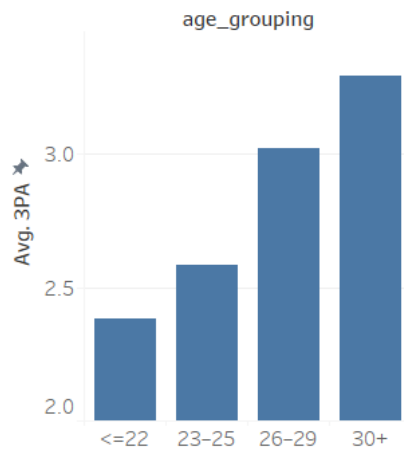|	age_group	num_players	avg_fga	avg_3pa	avg_2pa	avg_fta
1	<=22	132	6.4	2.4	4.0	1.6
2	23-25	169	6.8	2.6	4.2	1.8
3	26-29	129	7.9	3.0	4.8	2.1
4	30+	109	7.6	3.3	4.3	1.9

Visualization:
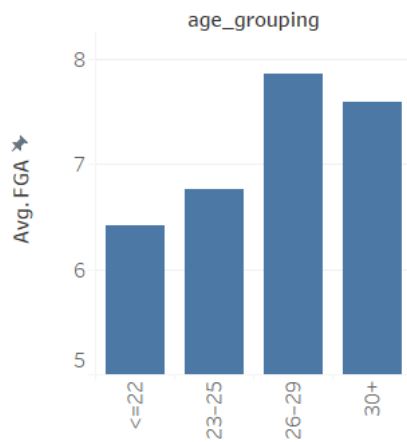
Analysis:

- FGA attempts per game peaks at 26-29, indicating this is the age where player's typically have the biggest role on a team.
- 3PA peaks at 30+ while 2PA peaks at 26-29. This indicates that players typically around the age of 30 change their shot selection to drive less (shown by fewer 2PA) to taking more 3s.
- FTA also peaks at 26-29 and then declines at 26-29. This is also in line with expectations and indicates that players are less aggressive driving the basketball (which leads to them getting fouled more) and play more passively after the age of 30.
- Overall the evidence suggests that players change their game after their athletic prime ends (usually around the age of 30) but are still able to maintain near prime-level scoring volume and efficiency through increased threes and fewer aggressive drives.

5. Implications for Team Building

- Contract design and roster construction
    - Assume notable regression for bigs after age-30 - especially defensively
    - Wings remain two-way assets into their early 30s and could be bargains at mid level deals.
    - Veteran guards retain value in lower-usage playmaking roles (think late-stage Chris Paul).
- Player Development
    - Prioritize shooting skills for young bigs to offset declining athleticism as they age
    - Teach defensive iq and rotations while young so they won't be a major defensive liability into their 30s.
- Championship Windows
    - Expect the largest all-around impact from players at ages 26-29 and surround them with veteran wings.