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Injury Risk Modeling Summary: Project Missed Games (PMG)

The goal of this project was to quantitatively estimate how many games each fantasy football player is projected to miss in the upcoming 2025 NFL season. While injuries are inherently unpredictable, this model leverages historical data and situational context to make injury probability more actionable for fantasy football players and analysts. The result is a newly developed metric: Projected Missed Games (PMG).

PMG (Projected Missed Games) is a numerical estimate (scaled between 0 and 4) representing the likelihood and magnitude of games a player is projected to miss due to injury over the course of the season.

This metric is designed to inform fantasy football draft strategy, especially for risk-averse or risk-tolerant managers, and to adjust ADP rankings to reflect true player availability.

The PMG calculation was designed through iterative refinement. It began by weighting core components of injury and usage risk, then scaled to a standardized 0–4 range for easy interpretability.

$$\text{PMG} = \text{Base Risk} + \text{Position Risk} + (0.10 \cdot \text{Touches/Game}) + (0.10 \cdot \text{Targets}) + (0.125 \cdot \text{Snap Counts}) + (0.20 \cdot \text{Injury History}) + (0.20 \cdot \text{Injury Severity})$$

All raw values were normalized via min-max scaling before being added to ensure a fair range between players.

PMG Formula Variables (Weighted Factors):

- Base Risk: 0.05

A universal baseline risk applied to all players (no one is injury-proof).

- Position Risk: 0.10

Adjusted by position: RBs typically face higher contact volume than WRs, TEs, and QBs.

- Touches per Game: 0.10

Measures how often a player handles the ball on average — more touches increase exposure.

- Targets: 0.10

Important for WRs and TEs; indicates involvement and play design even if not touching the ball.

- Snap Counts: 0.125

Reflects time spent on the field. More snaps = more chances for injury even without touches.

- Injury History: 0.20

A custom-scaled score representing how often and how significantly a player has been injured in the past.

- Injury Severity: 0.20

Weighs the long-term and reinjury risk of past injuries (e.g., ACL or Achilles > hamstring pull).

Final CSV Column Descriptions:

- Full Name: Player's full name
- Rank: ESPN PPR ADP rank (1–100)
- Position: QB, RB, WR, or TE
- Touches_Per_Game: Average touches per game in 2024

- **Targets:** Total number of targets in 2024
- **Snap_Counts:** Total offensive snaps played in 2024
- **Injury_History_Score:** Scaled score (0–4) based on the player's past injuries
- **Injury_Severity_Score:** Scaled score (0–4) based on the type and recurrence risk of injuries
- **PMG:** Final **Projected Missed Games** score (0–4), higher = greater risk
- **Tier:** Categorized risk tier (Very Low, Low, Moderate, High)

Data Source: ESPN ADP Top 100 (PPR), Mike Clay's 2025 NFL Projection Guide

Players: QB, RB, WR, TE only

Tools Used: R, Microsoft Excel

Visualization: Scatterplot of ADP vs PMG with Tier Zones and Player Names

Exported CSV: Contains full rankings, positional data, injury metrics, and adjusted risk tier

This model introduces a quantified method to compare injury risk across positions and players. It enables more data-driven drafting decisions and can be used in:

- Fantasy football research and podcasts
- Injury regression studies
- Draft optimizers and ADP risk-adjustment tools
- Sports analytics portfolios

This scatter plot displays the relationship between a player's ESPN ADP Rank (X-axis, 0 to 100) and their Potential Games Missed (PMG) (Y-axis, 0.0 to 4.0). The data is categorized by position (RB, WR, TE, QB) and risk tier (Tier 1: Very Low Risk, Tier 2: Low Risk, Tier 3: Moderate Risk, Tier 4: High Risk).

Legend:

- RB: Red 'x'
- WR: Blue 'x'
- TE: Green 'x'
- QB: Purple 'x'
- Tier 1: Very Low Risk: Lightest background color
- Tier 2: Low Risk: Light background color
- Tier 3: Moderate Risk: Medium background color
- Tier 4: High Risk: Darkest background color

Key Data Points (Player Name, Position, ESPN ADP Rank, PMG):

Player Name	Position	ESPN ADP Rank	PMG	Risk Tier
Christian McCaffrey	RB	10	3.9	Tier 4
T.J. Hockenson	TE	60	3.9	Tier 4
Chris Godwin	WR	70	3.9	Tier 4
Cooper Kupp	WR	85	3.9	Tier 4
Stefon Diggs	WR	95	3.3	Tier 4
Deebo Samuel	WR	98	3.0	Tier 4
Isiah Pacheco	RB	85	2.7	Tier 4
James Williams	WR	60	2.6	Tier 4
Mike Evans	WR	45	2.6	Tier 4
George Kittle	TE	40	2.5	Tier 4
Alvin Kamara	RB	25	2.5	Tier 4
Jonathan Taylor	RB	20	2.4	Tier 4
Davante Adams	WR	35	2.4	Tier 4
Jalen Hurts	QB	30	2.3	Tier 4
Tee Higgins	WR	30	2.9	Tier 4
James Conner	RB	45	2.1	Tier 4
Chuba Hubbard	RB	40	2.0	Tier 4
OK McCalister	WR	45	2.0	Tier 4
DeVonta Smith	WR	55	2.4	Tier 4
Adrian Jones	WR	70	2.4	Tier 4
Brandon Rountree	WR	75	2.4	Tier 4
Jauan Jennings	WR	80	2.3	Tier 4
Brian Robinson Jr.	WR	85	2.3	Tier 4
Keon Coleman	WR	95	2.1	Tier 4
Mark Andrews	TE	75	1.9	Tier 4
Jordan Addison	WR	70	2.0	Tier 4
Kyle Murray	WR	90	1.9	Tier 4
Ricky Pearsall	WR	95	1.8	Tier 4
Brock Purdy	QB	90	1.7	Tier 4
Javonte Williams	RB	85	1.6	Tier 4
Sam Darnold	QB	80	1.5	Tier 4
Willis Moore	QB	85	1.5	Tier 4
Stefon Pickett	QB	60	1.6	Tier 4
Calvin Ridley	WR	55	1.5	Tier 4
Jaylen Waddle	WR	60	1.5	Tier 4
D'Andre Swift	RB	55	1.6	Tier 4
Breece Hall	RB	45	1.5	Tier 4
James Smith-Njigba	WR	35	1.4	Tier 4
Ladd McConkey	WR	30	1.2	Tier 4
Joe Burrow	QB	40	1.3	Tier 4
Chase Brown	RB	40	1.0	Tier 4
Rashad Rice	WR	35	1.0	Tier 4
Xavier Worthy	WR	45	1.1	Tier 4
Zay Flowers	WR	55	0.9	Tier 4
Tony Pollard	RB	70	1.1	Tier 4
Josh Jacobs	RB	20	0.9	Tier 4
Drake London	WR	25	1.0	Tier 4
James Jackson	WR	30	0.7	Tier 4
James Cook	RB	30	0.7	Tier 4
Tyreek Hill	WR	35	0.6	Tier 4
Garrett Wilson	WR	45	0.7	Tier 4
Marvin Harrison Jr.	WR	45	0.5	Tier 4
DJ Moore	WR	45	0.4	Tier 4
Omarion Hampton	WR	50	0.3	Tier 4
Quinnshon Judkins	WR	50	0.2	Tier 4
Courtland Sutton	WR	55	0.5	Tier 4
Berry Jueid	WR	55	0.4	Tier 4
Travis Hunter	WR	60	0.7	Tier 4
Patrick Mahomes	QB	70	0.6	Tier 4
Matthew Golden	WR	80	0.7	Tier 4
Khalil Shakir	WR	80	0.6	Tier 4
Kaleb Johnson	WR	85	0.6	Tier 4
Travon Henderson	WR	85	0.5	Tier 4
Baker Mayfield	QB	90	0.3	Tier 4
Bo Nix	QB	90	0.0	Tier 4
Cam Skattebo	WR	95	0.3	Tier 4
Hyden Reed	WR	95	0.2	Tier 4
Michael Pittman Jr.	WR	95	0.8	Tier 4
Justin Jefferson	WR	10	1.3	Tier 3
Saquon Barkley	RB	10	1.8	Tier 3
Nico Collins	WR	20	1.8	Tier 3
A.J. Brown	WR	20	1.7	Tier 3
De'Von Achane	RB	20	1.6	Tier 3
CeeDee Lamb	WR	15	1.5	Tier 3
Malik Nabers	WR	15	1.4	Tier 3
Kyrin Williams	RB	20	1.4	Tier 3

A histogram showing the distribution of Projected Missed Games (PMG) for the 2019-2020 season. The x-axis is labeled 'Projected Missed Games (PMG)' and ranges from 0.0 to 4.0. The y-axis is labeled 'Number of Players' and ranges from 0 to 10. The histogram bars are purple. A smooth purple curve is overlaid on the histogram, representing a normal distribution fit. The distribution is roughly bell-shaped, centered around 0.5 to 1.0 PMG.

Projected Missed Games (PMG) Bin	Number of Players
0.0 - 0.2	6
0.2 - 0.4	10
0.4 - 0.6	11
0.6 - 0.8	10
0.8 - 1.0	4
1.0 - 1.2	4
1.2 - 1.4	7
1.4 - 1.6	9
1.6 - 1.8	4
1.8 - 2.0	5
2.0 - 2.2	6
2.2 - 2.4	5
2.4 - 2.6	7
2.6 - 2.8	2
2.8 - 3.0	1
3.0 - 3.2	2
3.2 - 3.4	2
3.4 - 3.6	0
3.6 - 3.8	1
3.8 - 4.0	4

